the OIL AND GAS JOURNAL

Cameron Valves NEED NO LUBRICATION

May even be buried!

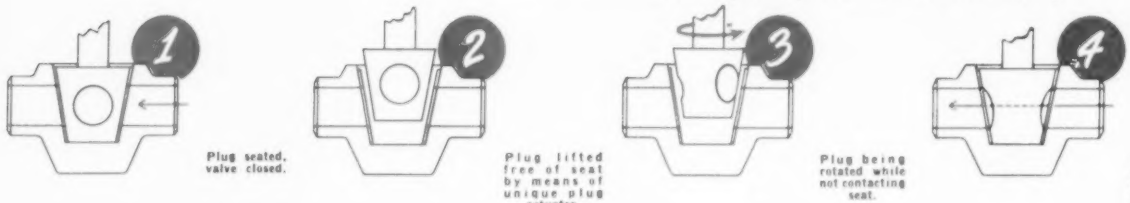
NON-LUBRICATION ADVANTAGES:

- Saves lubrication maintenance.
- Banishes lubricant inventory.
- Prevents contamination of line products and fouling of delicate measuring instruments.
- Does away with sticky, difficult operation.
- Eliminates necessity of special lubricants for special services.

Since Cameron Lift-Plug Valves require no lubrication or other periodic maintenance, they may be buried or installed in any inaccessible location. They can be furnished with extension wrenches, as illustrated at right, with chain wheel drives, or with mechanical, pneumatic, hydraulic or electric remote controls.

Cameron
IRON WORKS, INC.
P. O. Box 1212, Houston, Texas
EXPORT OFFICE: 7912 EMPIRE STATE BLDG., NEW YORK CITY

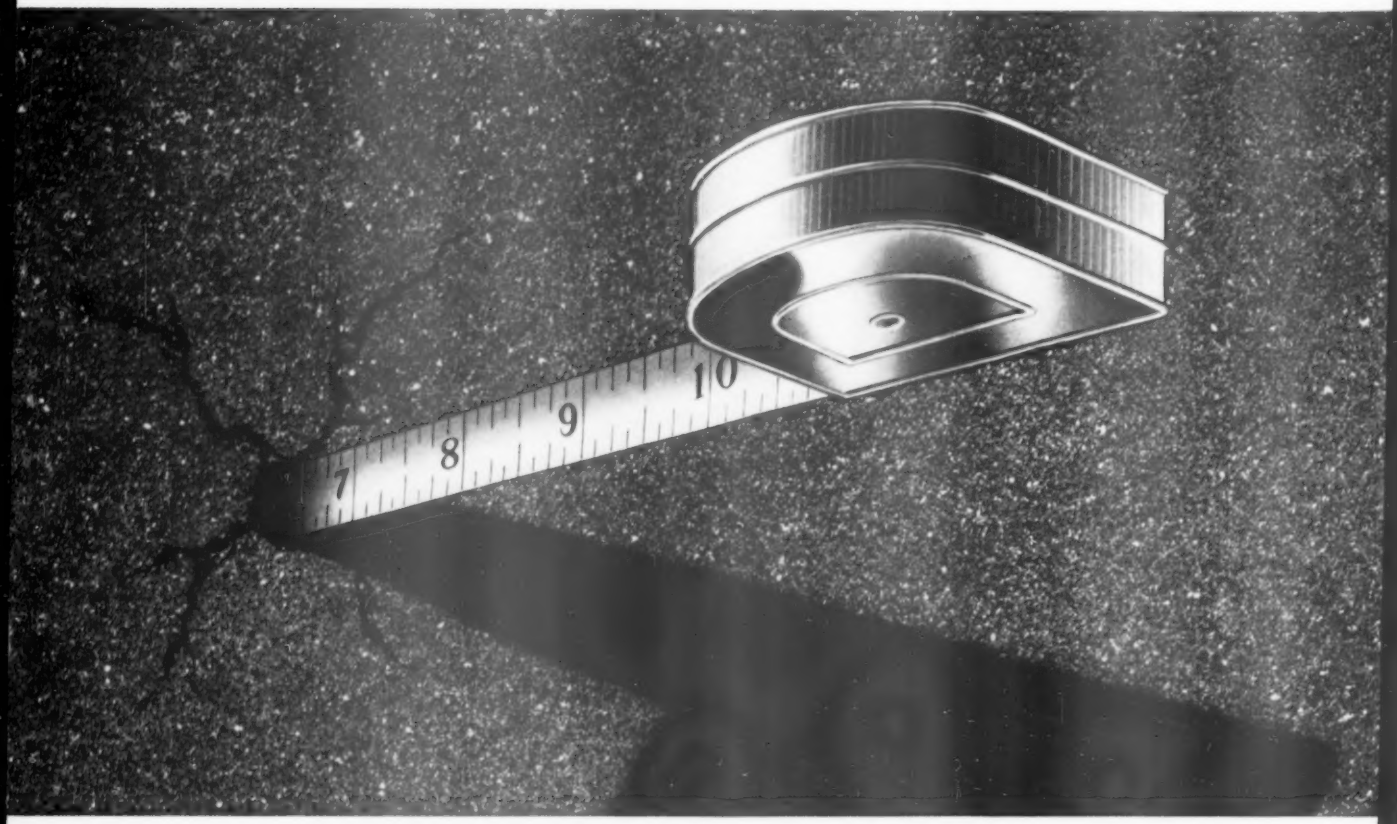
One of a large number of Cameron Valves on underground gas pipelines near Carthage, Texas. Inset — W. H. "Hap" Phillips, Cameron's District Sales Manager, with Extension Wrench Operater (and Cameron Valve on ventline).



1. Plug seated, valve closed.
2. Plug lifted free of seat by means of unique plug actuator.
3. Plug being rotated while not contacting seat.
4. Plug having been rotated 90° to open position, without friction, is then seated.

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 MARCH 15, 1954

FOR DEEP PENETRATION
in gun perforating



your best bet is to call Lane-Wells

There are lots of reasons why, but right now, let's talk *results*... like that shown in the drawing. That's the average penetration delivered by Lane-Wells' $4\frac{7}{16}$" A-2 bullet gun. Other Lane-Wells bullet guns deliver even greater penetration, and we have Koneshot guns that can give as much as 18" penetration, but of course they can't be used on every job. The point is, Lane-Wells has both bullet *and* Koneshot guns tailored to fit every kind of perforating job. Singly, *or in combination*, they'll deliver the penetration *your* job demands. Check it for yourself...

Tomorrow's Tools - Today!

Write for your free copy of
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PENETRATION CHARTS

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the OIL AND GAS JOURNAL

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In Brief . . .

1. BETTER METERING . . . A controlled-volume pump is an instrument designed to accurately meter liquids in measured volumes against a positive pressure differential between suction and discharge of pump. This metering action is possible with a degree of accuracy exceeding that of many flow meters—in most instances to a fraction of 1 per cent. The pump consists of a plunger reciprocating in a properly designed displacement chamber at a speed sufficiently slow to assure complete positive displacement of a volume of liquid equivalent to a cylinder of plunger diameter and stroke length.

2. NEW DRILLING REPORT . . . A new standard drilling report, tentatively approved by A.P.I. and A.A.O.D.C., offers these benefits: (1) saves time for the driller, since there is only one form to fill out; (2) eliminates controversies in accounting between the company and the contractor caused by errors made when filling out two different reports; (3) insures completeness and accuracy because of standardization; and (4) provides adequate information for analysis of daily drilling operations by management.

3. EFFICIENT PUMPING . . . The most important and simplest general application of dynamometer cards is the making of torque calculations. The only two dynamometer loads needed are the well load and the counterbalance weight. With that information and appropriate charts, reliable torque calculations can be easily made.

4. ACCURATE V. I. PREDICTION . . . Blending charts can be prepared to permit the accurate prediction of viscosity index and viscosity for systems containing two or more viscosity-index improvers. Separate nomographs must be constructed for each pair of additives employed, but they are applicable for all base oils regardless of the crude-oil source.

5. OPTIMUM FLOW . . . In the automatic pipe-line system a dispatcher located at a suitable position can set up an economic schedule of requirements, and can control the system to meet these requirements. Functional requirements of the equipment for the necessary automatic system are not complex, and required investment is not excessive.

The Petroleum Industry Insists On

HARTZELL Fans for Its

Cooling Towers and Heat Exchangers

Hartzite plastic for cooling tower and heat exchanger fan blades was developed especially to meet the rugged requirements of the petroleum industry. After more than ten years of service in the most punishing installations, Hartzite blades have proved themselves beyond all expectations.

What evidence is there of the superiority of Hartzell cooling tower and heat exchanger fans with Hartzite blades? Nearly every Hartzell fan installed since the introduction of the Hartzite blade in 1941 is still in service. And in nearly every case, where one Hartzell fan has been installed on a battery of cooling towers or heat exchangers, more Hartzells have followed as other blades needed replacement.

Fabric-base Hartzite absorbs vibration. Its strength is many times that necessary to withstand normal stresses. Its unusual resistance to corrosion and abrasion is constant throughout the blade. Hubs are of welded steel with an extremely high safety factor.

These are the reasons why Hartzell has become "the" cooling tower and heat exchanger fan in the petroleum industry.

For the complete story, send for Bulletin 1503.

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Company _____

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PROPELLER-TYPE FANS • BLOWERS
ROOF VENTILATORS • UNIT HEATERS

ENGINEERING OFFICES IN PRINCIPAL CITIES

Only B. F. Goodrich rotary drilling hose has all these features

Stronger, more flexible, longer lasting, with exclusive Permalock coupling

Here's a hose that can drill under high rock and gas pressures, that your crew can treat rough, that will keep your rig on the job with a minimum of hose trouble.

Extra strength for deep drilling

Two spiral-wrapped plies of high tensile cable wire, plus eight plies of sturdy fabric give B. F. Goodrich Highflex hose extra strength for extreme bottom hole pressures. Qualifies for Grade C (5000 lb. test pressure) American Petroleum Institute. As an extra protection against bending stress at the coupling, hose ends are reinforced with additional layers of wire and fabric. This extra strength means no hose "blowouts"—added safety for your crew and rig.

Flexible, easy to handle

For all its toughness, this hose is still the most flexible one made for heavy-duty service. It's easy to attach to the rig, to move from one well to another, and it coils without kinking or "snaking".

Abrasion-resistant, tough cover

Because it's made of the highest grade, abrasion-resisting rubber, the cover on Highflex hose has strength to spare even when handling is rough. Its thick, tough cover resists gouges, scrapes, tears. Year round exposure to sun, wind, and rain will not harm it.

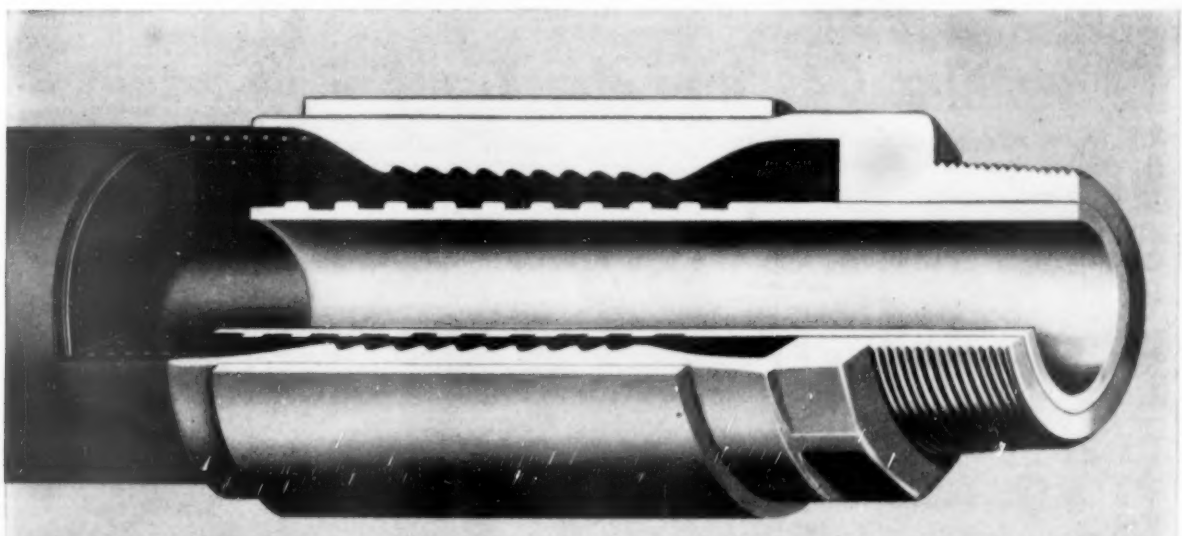
Oil won't rot tube

Oil in the mud will not cause swelling or rotting of tube. Also abrasion resisting.

Saves waiting

B. F. Goodrich Highflex rotary drilling hose with exclusive Permalock couplings is available at leading supply houses in the major drilling areas. However, should your local supplier be temporarily out of stock when you call, you can get the BFG hose you need any time—day or night—from one of these B. F. Goodrich warehouses: Beaumont, Dallas, Fort Worth, Hobbs, Houston, Odessa, Wichita Falls, Great Bend, Oklahoma City, Tulsa, Williston, Denver and Los Angeles. *The B. F. Goodrich Company, Dept. M-153 Akron, Ohio.*

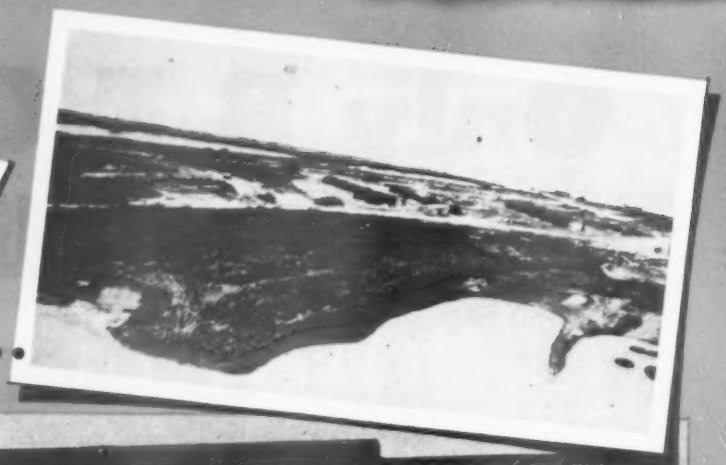
B.F. Goodrich
INDUSTRIAL PRODUCTS DIVISION



Exclusive Permalock coupling—Much lighter, more compact than other types of couplings. Same inside diameter as hose, assuring full flow. Will not move out of position under highest drilling pressures. Guaranteed to be leakproof.

Alone on an Island

16 hours per day...



This "Oilwell" DGE-250 Two Stage Compressor Unit is designed to handle 1,090,000 cubic feet of gas per day with 250 input horsepower. Horizontal fan provides forced air flow vertically through radiator cores, so that prevailing winds do not affect cooling efficiencies.

... called for gas-handling equipment that could do the job by itself ... that's why Mel Dar Corporation engineers selected this "Oilwell" Direct-Drive Compressor Unit for ...

Boosting Gas into the Transmission Line

Some 17 Miles out in the gulf near Corpus Christi, Texas, a field of 155 producing wells is centered around a 160-acre island which gets drenched by mist and spray from every passing storm. Nobody lives there. The production men make daily trips from the mainland by launch. The rest of the time this installation operates unattended.

Because of their fully-enclosed weatherproof design, "Oilwell" DGE Compressor Units with direct drive between prime mover and compressors, meet the all-weather operating requirements of such isolated locations perfectly.

On this lease, all of the wells produce wet gas which comes from separators at approximately 30 psi and is compressed by this two-stage unit to approximately 760 psi. Following passage through an after-cooler and dehydrating unit, it is then mixed with dry gas from other wells and injected into Tennessee Gas Transmission Company lines for transmission to northeastern markets.

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When you have GAS PUMPING problems

... let an "Oilwell" representative quote on the "Oilwell" Unit that meets your requirements most economically, throughout the 20 to 300 h.p. range.

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL"

TRADE MARK

UNITED STATES STEEL

A CONTAMINATION-FREE PRODUCT *with* OPW

LINE STRAINERS

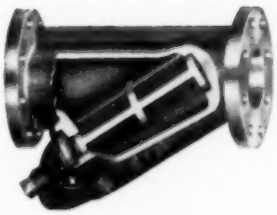
187

Bottom Outlet Type

Is your product absolutely clean, your pump and loading valve protected against scale, grit, dirt and other foreign materials?

Be sure! Use OPW Line Strainers for a contamination free product. Tight fit of cage and screen assures all product passing through strainer. Screen areas are many times pipe size for full flow. The simplicity of screen removal, cleaning and replacing, facilitates regular, periodic checkup in the shortest possible time.

Choose your size, type and mesh! 125-pound standard or 200-pound high pressure types. Bottom or top outlet cage, reinforced for sturdiness and precision-fit. Screwed or flanged end. Flanges, bolts and gaskets to suit. Strainer meshes from 14 to 300.



No. 187-F

Bottom opening type. Heavy cast iron body, 125 pound. Furnished with 40 mesh bronze cage, reinforced screen for gasoline, 14 mesh brass screen for fuel oil.

No. 387

Top outlet type. 125 pound. Heavy ribbed iron body has tapped plug in top section for air relief connection, also bottom drain plug. Both drilled for seal wires.

No. 487-F

Top outlet type 200 pound flanged, drilled and faced on pipe ends with bolted, gasketed cap.

No. 387-F

Top outlet type cage, perfect for pit application. 125 pound flanged, drilled and faced. Cap can be seal wired to prevent tampering.

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MURPHY DIESEL *POWER*

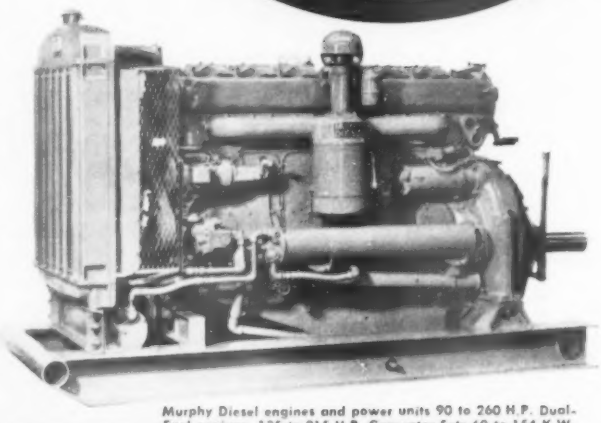
DRILLS 12—5,000 FT. WELLS IN DENVER-JULESBURG BASIN AT FUEL COSTS OF 6½¢ per ft. for WAGNER & WYANT DRILLING CO.

ANOTHER favorable Murphy Diesel Economy report comes from the Wagner & Wyant Drilling installation in northeastern Colorado. In making nearly 60,000 feet of hole during 120 drilling days, fuel cost per foot averaged 6½¢. And this cost included fuel for heating and cleaning up the rig as well as generating power for rig lights and shale shaker.

The Murphy Unit Injector assures fuel economy like this on every job and this is just one of the reasons more and more Murphys are seen working the oil fields. Quick responsiveness to load changes made possible by the Hydraulic Servo-Type Governor and Murphy's rugged dependability and lugging power all combine to help drillers really unspool it.

Ask your Murphy dealer for a copy of *"10 Reasons Why Your Next Engine Should Be A Murphy"*, or write direct.

MURPHY DIESEL COMPANY
5305 W. Burham St., Milwaukee 14, Wisconsin
FACTORY BRANCH—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma



Murphy Diesel engines and power units 90 to 260 H.P. Dual-Fuel engines, 135 to 215 H.P. Generator Sets 60 to 154 K.W.

285

MURPHY DIESEL

SEE YOUR MURPHY DIESEL DEALER, TODAY—

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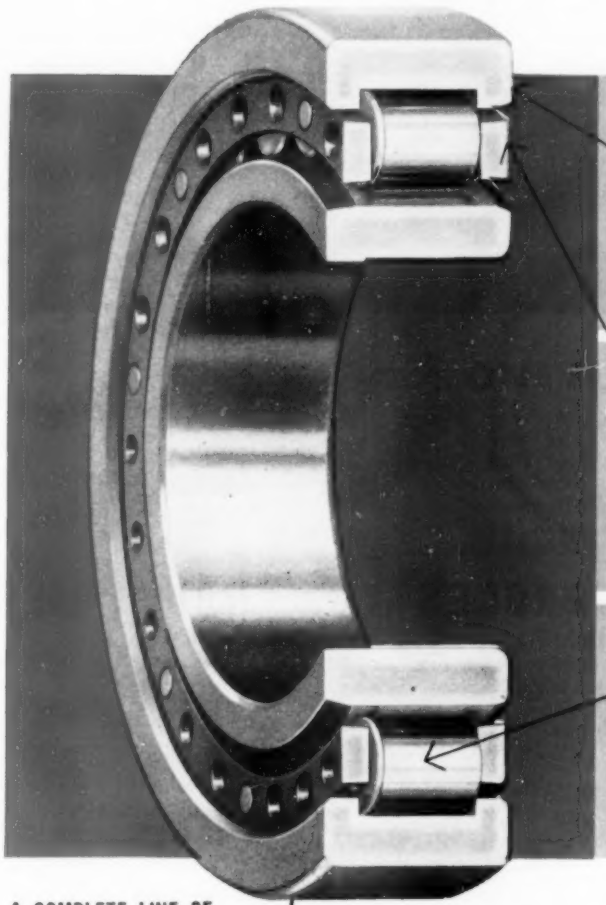
Here's why BOWER straight roller bearings can carry maximum loads—with less maintenance!

The important design features of Bower straight roller bearings shown on this page are just a few of the reasons why these bearings will operate efficiently and economically in your product. Consider these facts, too. Bower straight roller bearings incorporate highest quality materials and workmanship. They have proved themselves capable of standing up day in and day out under maximum loads—with little or no maintenance.

In fact, this is the reason why Bower straight roller bearings are used extensively by leading manufacturers in such fields as automotive, earthmoving, farm equipment and machine tool.

Let a Bower engineer give you full details of the complete Bower line. Call him in while your product is still in the blueprint stage.

BOWER ROLLER BEARING COMPANY • DETROIT 14, MICHIGAN



● ***TWO-UP RACE INCREASES RIGIDITY.*** These two shoulders, made parallel, are integral with the outer race. This provides a more rigid, durable construction. Rollers are kept in proper alignment at all times.

● ***COMPOSITE STEEL CAGE DOES NOT CONTACT ROLLERS DURING NORMAL OPERATION,*** thereby allowing free movement of the rollers between the races. Projections on the inner faces of the rings engage indentations on the roller ends prevent'ng the rollers from dropping out of position when the separable race is removed.

● ***PRECISION-BUILT ROLLERS AND RACES ARE MADE TO SUPPORT MAXIMUM RADIAL LOADS.*** Only the highest grade steel-alloy is used, and rollers and races are precision ground to give quieter, smoother operation. Running clearance is built in at the time of manufacture.

A COMPLETE LINE OF TAPERED, STRAIGHT AND JOURNAL ROLLER BEARINGS FOR EVERY FIELD OF TRANSPORTATION AND INDUSTRY

BOWER

ROLLER BEARINGS

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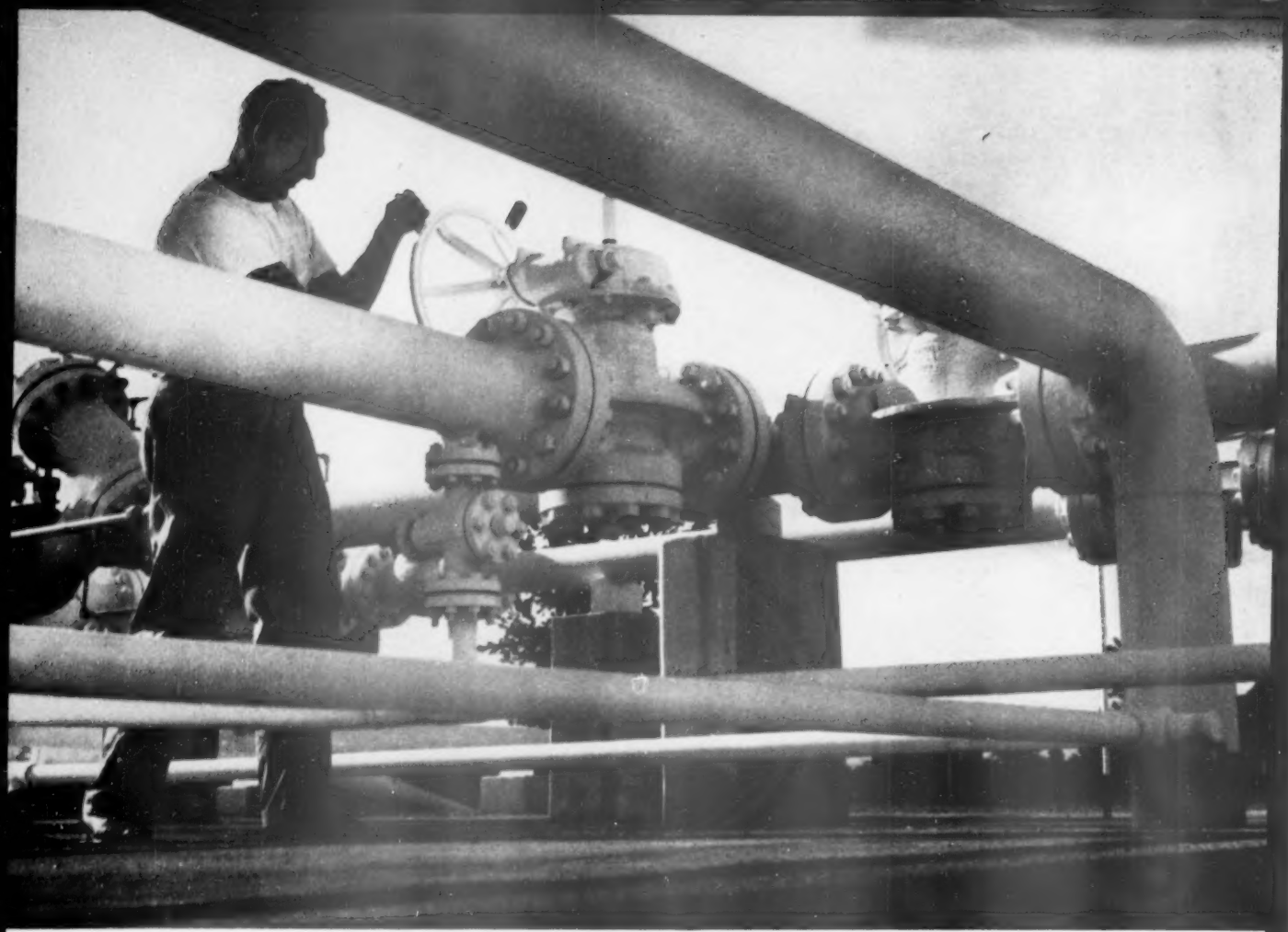


Why ROCKWELL-Nordstrom VALVES *are First Choice*

IN THE REFINING AND PROCESSING INDUSTRIES

Thousands of Rockwell-Nordstrom valves are installed on refining and petroleum processing lines. The reason for the success of Rockwell-Nordstrom valves on these services is that their lubricant-sealed closure gives a tighter shut-off than is possible with any other type of valve.

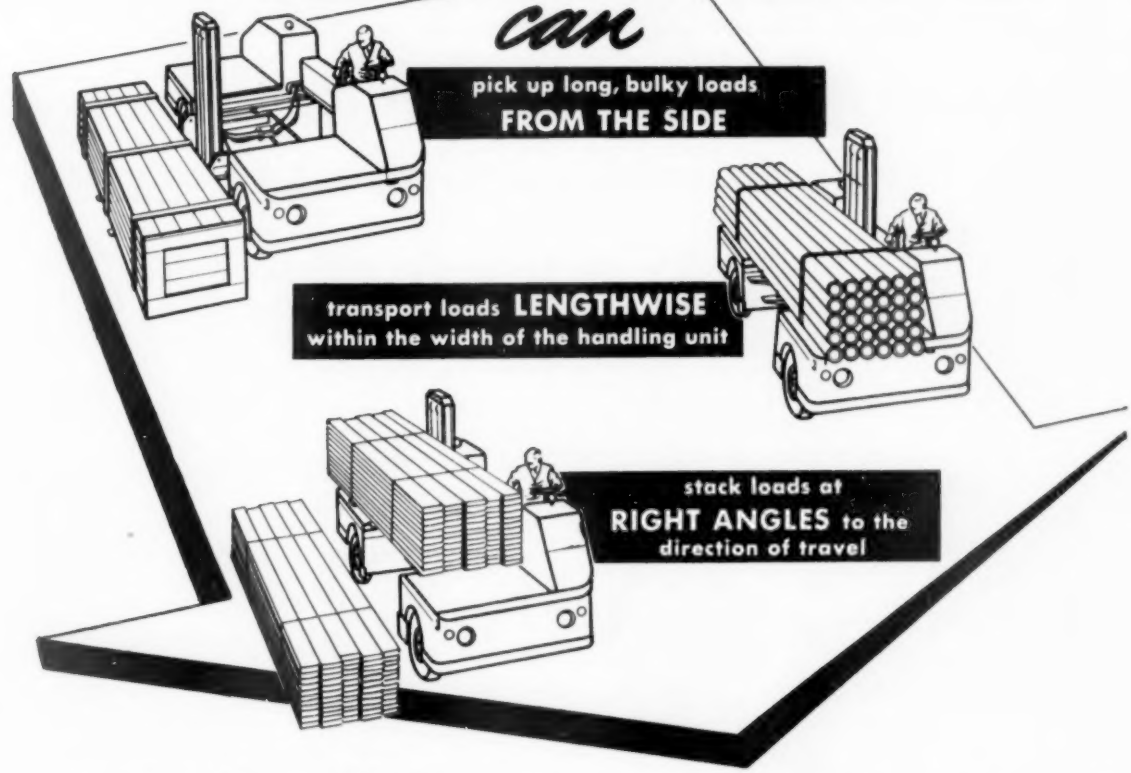
And Rockwell-Nordstroms last longer, too. Protected by a film of lubricant, the seating surfaces are never exposed to the line fluid, never subjected to the metal-to-metal abrasion so common in ordinary valves.

Also important is the fact that Rockwell-Nordstrom valves are ready to operate easily no matter how long they have remained in one position.

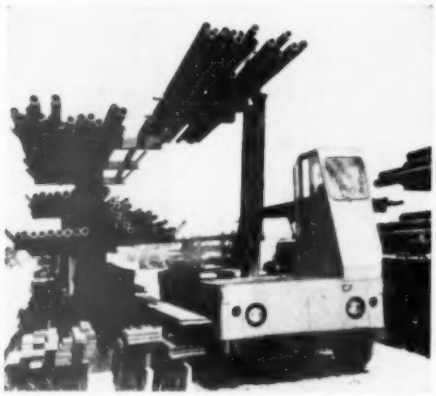
For further information on Rockwell-Nordstrom valves for refinery and processing services, call your Rockwell representative or write Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Licensee: Peacock Brothers Limited.*

ROCKWELL-Nordstrom VALVES *Lubricant-Sealed for Positive Shut-Off*

Only Traveloader can


pick up long, bulky loads
FROM THE SIDE
transport loads LENGTHWISE
within the width of the handling unit
stack loads at
RIGHT ANGLES to the
direction of travel

...and do all 3 with ONE MACHINE and ONE OPERATOR!



An ideal combination for efficient yard storage of pipe, bar stock, long steel shapes, etc.—Traveloader and "Christmas tree" racks.

Here is an entirely new approach to mechanized handling of big, bulky, awkward or long loads. By combining side-loading fork lift and pneumatic tired carrier in a single machine, TRAVELOADER answers many problems that defy solution with any other equipment.

TRAVELOADER LOADS FROM THE SIDE. You simply drive beside the load, pick it up and move on in the same straight line. No time wasted in maneuvering or backing up. Operates easily in 10 ft. aisles with loads of any length.

TRAVELOADER CARRIES LOADS LENGTHWISE. Any length and any width up to 5 ft. rides securely on the truck deck—within the width of the unit. Narrow roadways or doors and low ceilings present no problem. Weight is distributed equally over four wheels. Travels safely at speeds up to 30 MPH.

TRAVELOADER UNLOADS OR STACKS AT RIGHT ANGLES TO TRAVEL DIRECTION. Safely tiers to heights of 12 ft. alongside narrow aisles. Increases capacity of storage areas and eliminates need for additional equipment or personnel. One man does it all!

write for descriptive bulletin containing action photographs, construction details and specifications.

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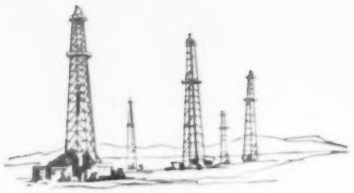
The Baker-Lull Corporation, Subsidiary, Minneapolis, Minnesota
Material Handling and Construction Equipment

Baker
industrial trucks

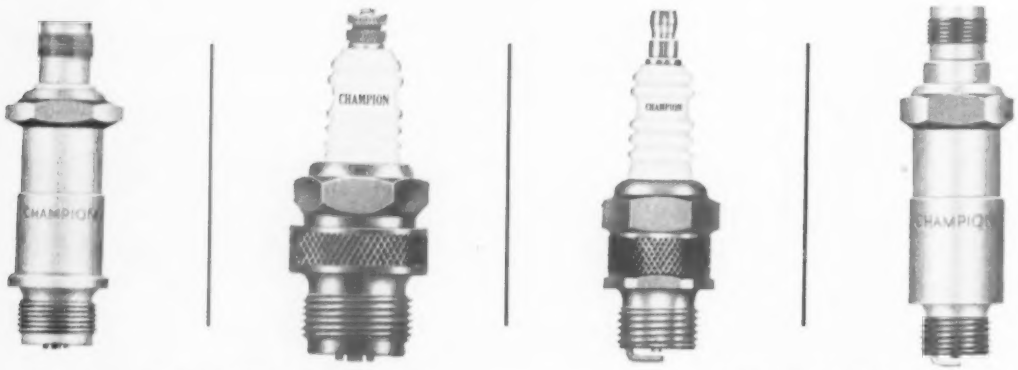
CHAMPION



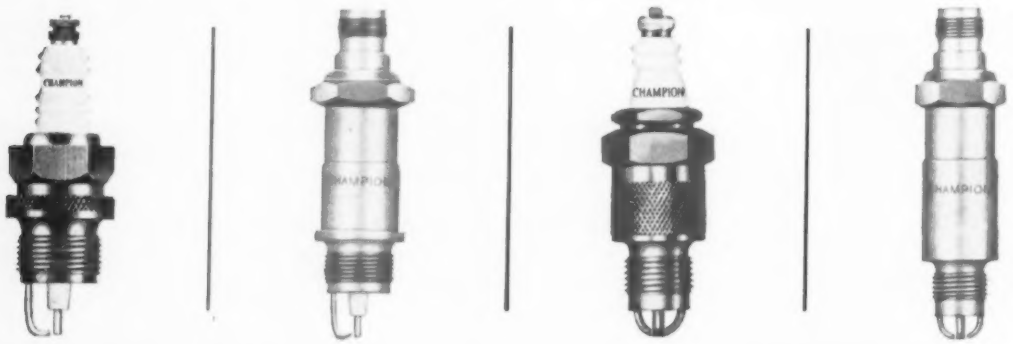
CHAMPION INDUSTRIAL AND OIL FIELD SPARK PLUGS

ARE PRECISION-ENGINEERED TO MAKE ANY JOB

EASIER-SAFER-BETTER!



E-901 GAS ENGINE 901 6 COM. GASOLINE UNITS E-6 COM.



44 DIESEL STARTING E-44 D-8 HESSELMAN ED-8

Shielded or unshielded to best suit your safety requirements, Champions are precision engineered for the specific job and have earned a reputation for long, trouble-free service life under the toughest conditions.

Only Champion offers a complete line of spark plugs for all industrial and oil field engines, gasoline, natural gas, Hesselman and diesel.

BEST FOR ANY ENGINE

CHAMPION

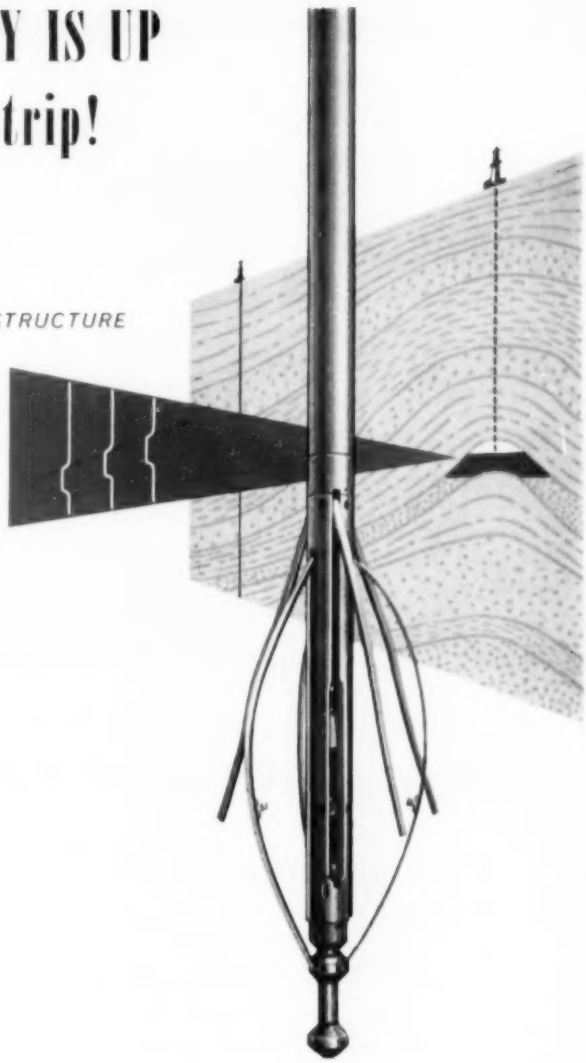
SPARK PLUGS

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

DIP LOG

TELLS WHICH WAY IS UP in 1 non-stop trip!

DIRECTS DEVELOPMENT WELLS HIGHER ON STRUCTURE



Finding out which way is up – where to locate test wells on structure – which direction to develop the reservoir if test is productive can effect a great savings in time and money.

Halliburton's new electronic well logging device – the Dip Log – gives you this valuable information. In one non-stop trip, it measures angle and dip. Its accuracy in recording even low angle dips is outstanding.

Three sensitive caliper arms record their erosion findings electronically on a lateral depth scale of 1" of record to 1' of hole. Traces revealing inclination and direction of dip, orientation of tool, depth marker, and a lubber's line are obtained with no stops for station.

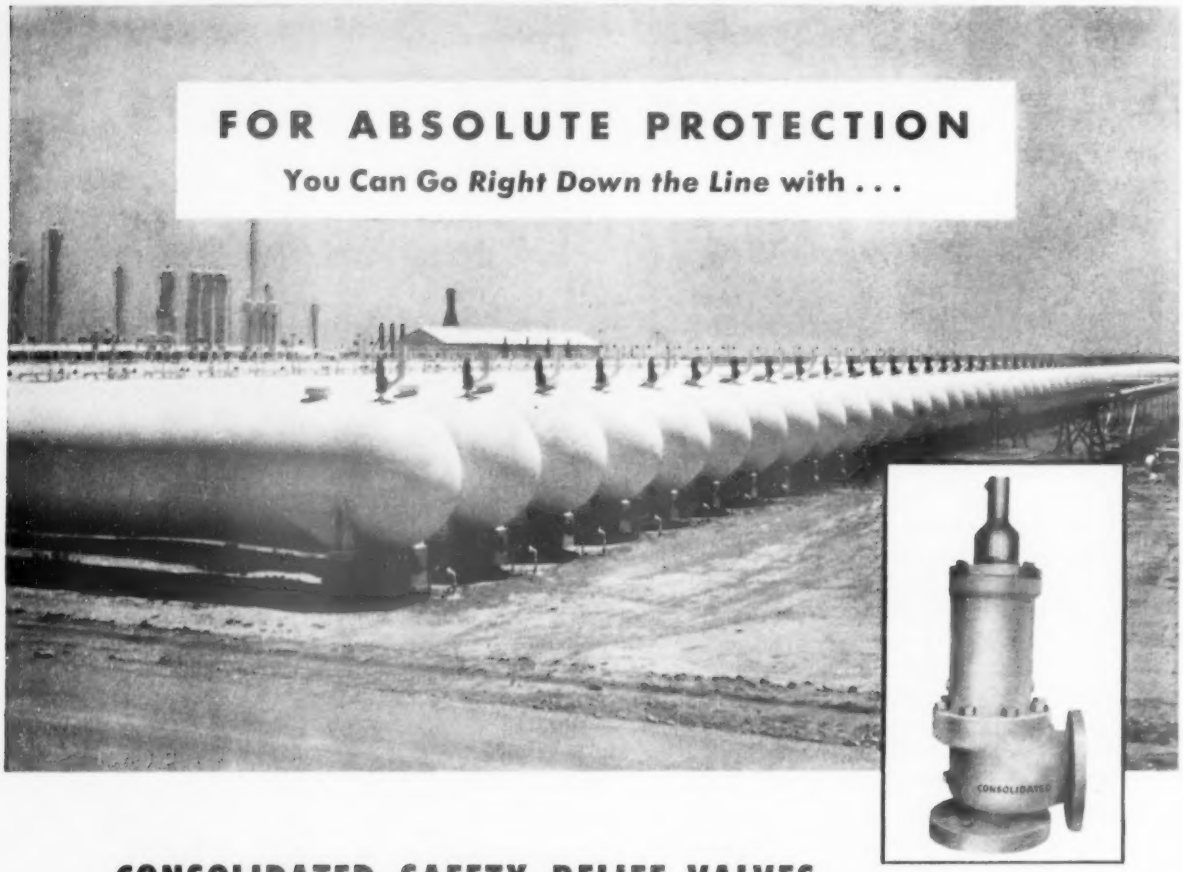
The value of this subsurface data depends on another factor: proper interpretation of the Log. Halliburton's highly-skilled specialists correlate all available information with considered thoroughness.

Before you spud in the next well, let Halliburton's Dip Log tell you which way is up-structure. Phone your local or district Halliburton office. Or write for the Dip Log Bulletin to Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

ELECTRICAL WELL SERVICES

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES!



CONSOLIDATED SAFETY RELIEF VALVES

COMPLETE PROTECTION for personnel, property and equipment rates top priority in safety engineering wherever industry must confine gases, vapors and liquids in unfired pressure vessels. That is why Consolidated Safety Relief Valves are such a common sight on processing facilities, pipelines, pumps and storage tanks.

Consolidated Safety Relief Valves incorporate design and construction features that assure *dependable tightness* under the severest discharge piping stresses. Unfired pressure vessels are absolutely safeguarded against overpressures. No matter how tough the conditions of use, you can be sure of continuously reliable performance at the rated capacity.

SIMPLE DESIGN — 25% fewer parts than ordinary safety valves — means that Consolidated Safety Relief Valves minimize maintenance and standardization problems and save in long-life operation.

Write for complete information.

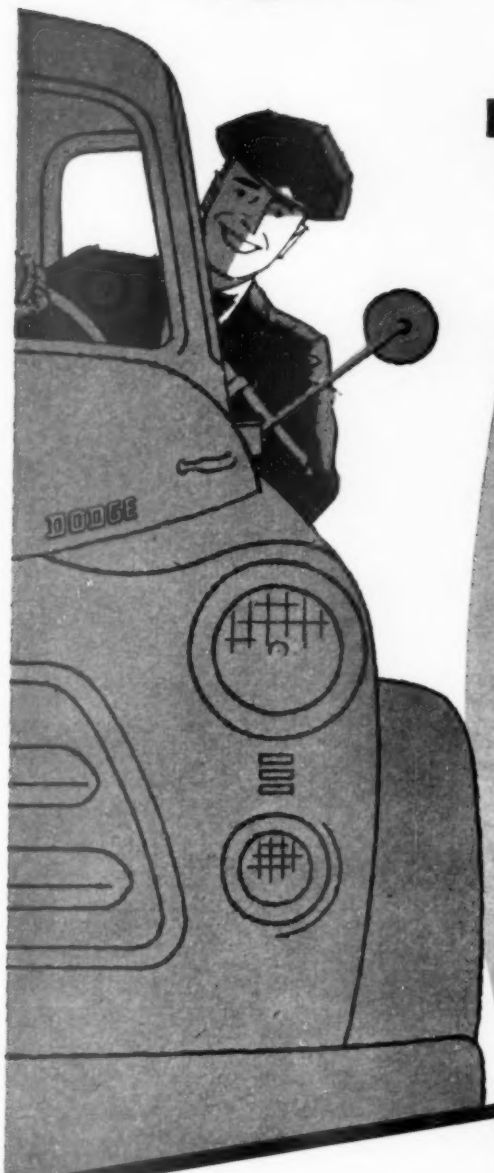
CONSOLIDATED 1879 U.S.A.

CONSOLIDATED SAFETY RELIEF VALVES

A product of **MANNING, MAXWELL & MOORE, INC.** TULSA, OKLAHOMA

MAKERS OF 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

New DODGE "Job-Rated" TRUCKS



WITH

NEW! Roomiest Cab! Wide, 3-man cab with easy-chair seat. 951 sq. in. windshield and best all-around visibility of any make.

NEW! Sharpest Turning! 39° turning angle, short wheelbase design for top maneuverability. Easiest handling trucks there are!

NEW! V-8's and Sixes! Most powerful V-8's in popular field—133 to 172 h.p. Plus famous Dodge Sixes. 7 engines in all.

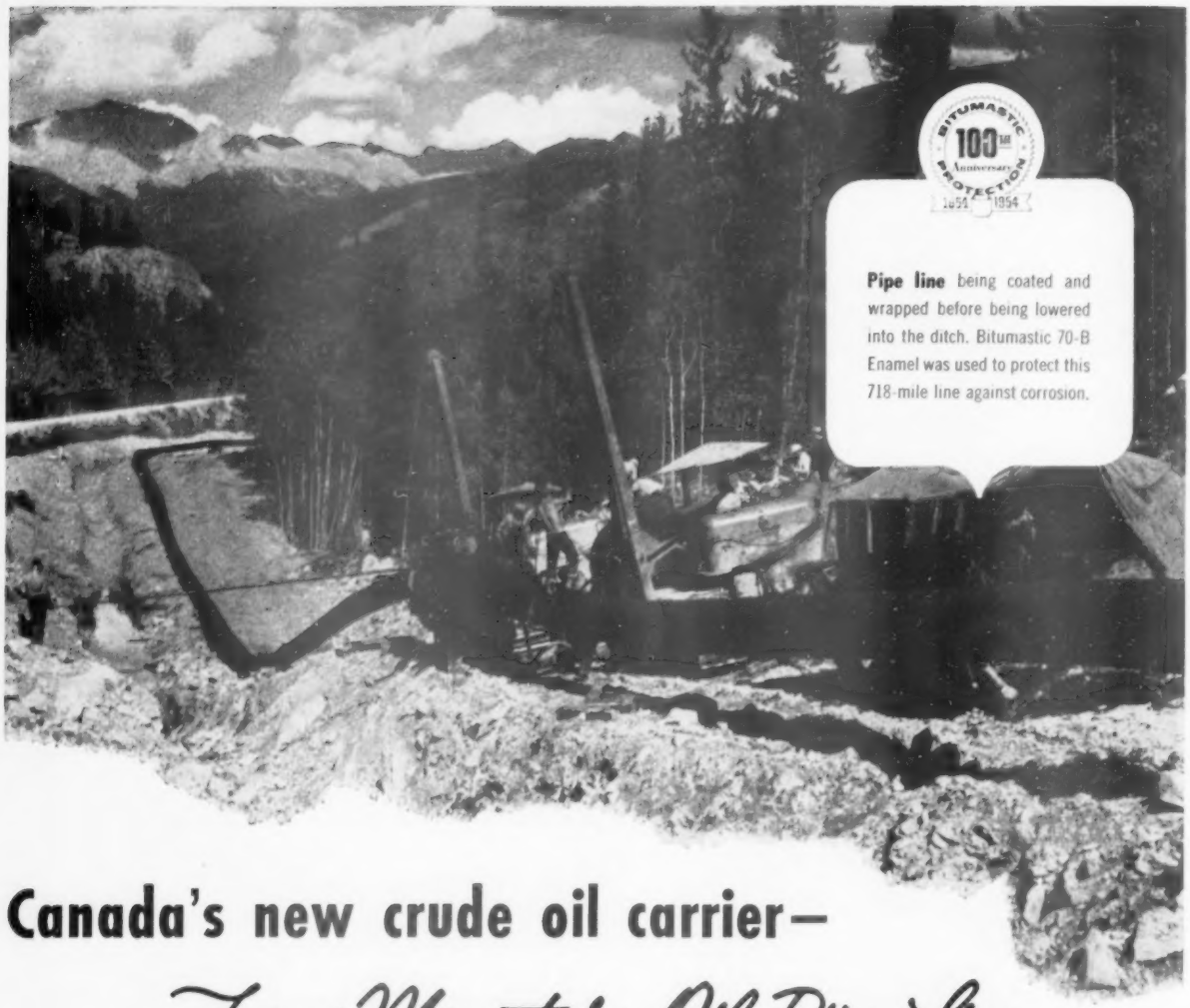
NEW! Low-Built Lines! Built low for better road stability, easier loading, ground-hugging good looks. Lower step for easier cab entry.

ALL ADD UP TO

"A better deal for the man at the wheel"

All-new Dodge trucks offer a better deal in low operating and upkeep costs, too . . . are priced with the lowest. Make it a point to call your friendly Dodge dealer—or drop in to see him soon. You'll like these new trucks!

See "Break The Bank" with Bert Parks on TV (ABC, Sundays).
Hear "The Roy Rogers Show" on radio (NBC, Thursdays).
See "Make Room For Daddy" with Danny Thomas on TV (ABC, Tuesdays).
Enter the Dodge 40th Anniversary All America Contest. See your dealer.



Pipe line being coated and wrapped before being lowered into the ditch. Bitumastic 70-B Enamel was used to protect this 718-mile line against corrosion.

Canada's new crude oil carrier—

Trans Mountain Oil Pipe Line

—protected by Bitumastic 70-B Enamel

A river of oil now rolls all the way from Edmonton, Alberta, to Vancouver, British Columbia—a distance of 718 miles. Each day, more than 100,000 barrels of crude oil can be pumped through the Trans Mountain Oil Pipe Line that was recently completed.

Building this new 24-inch pipe line wasn't easy. Mountains had to be climbed. Rivers had to be forded—forded, at times, by using sealed sections of pipe as pontoons for temporary bridges. In some mountainous terrain, after using trucks, tractors and winches, pipe had to be carried into position, piece by piece.

A pipe line laid in such rough terrain deserves exceptional protection against corrosion. Recognizing this, Trans Mountain has coated the exterior surfaces of its new line, all 718 miles of it — with Bitumastic® 70-B Enamel. More than 20 years of satisfactory service protecting oil and gas pipe lines prove that Bitumastic 70-B Enamel is an excellent corrosion barrier.

For your next pipe-line project, specify Bitumastic Enamel. Get in touch with us for complete details and estimates.

KOPPERS BITUMASTIC ENAMELS
REG U.S. PAT. OFF.

KOPPERS COMPANY, INC.
Tar Products Division, Dept. 303-T, Pittsburgh 19, Pennsylvania
DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

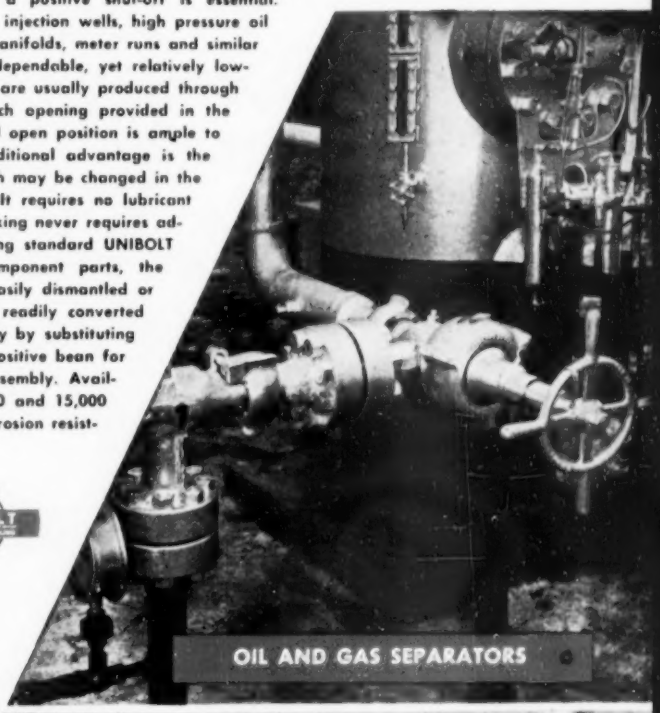
wherever flow control is important

UNIBOLT

adjustable wing valves are your best bet !

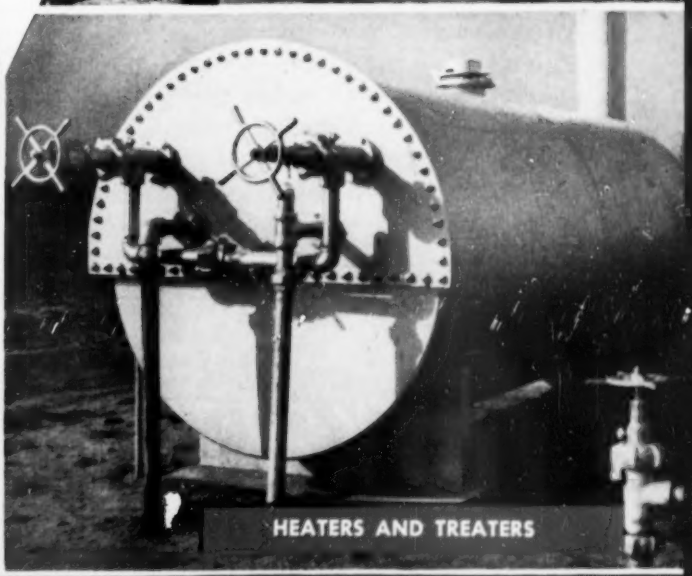
The UNIBOLT Wing Valve, designed originally for use as an adjustable choke where well conditions did not demand a positive choke, has become popular with production men as a dependable valve for numerous services where a positive shut-off is essential. Christmas trees for both producing and injection wells, high pressure oil and gas separator manifolds, heater manifolds, meter runs and similar services are made to order for this dependable, yet relatively low-cost valve. Since high pressure wells are usually produced through a small positive choke, the one-inch opening provided in the UNIBOLT Wing Valve when in full open position is ample to assure unrestricted flow. An additional advantage is the replaceable stem and seat, which may be changed in the field, easily and at low cost. It requires no lubricant to effect a seal. The stem packing never requires adjustment or tightening. Having standard UNIBOLT Couplings between its component parts, the UNIBOLT Wing Valve is easily dismantled or assembled, and may be readily converted to a Positive Choke Body by substituting a blanking plug and positive bean for the stem and seat assembly. Available in 6,000, 10,000 and 15,000 lbs. test, and in corrosion resistant alloy.

GATHERING MANIFOLDS



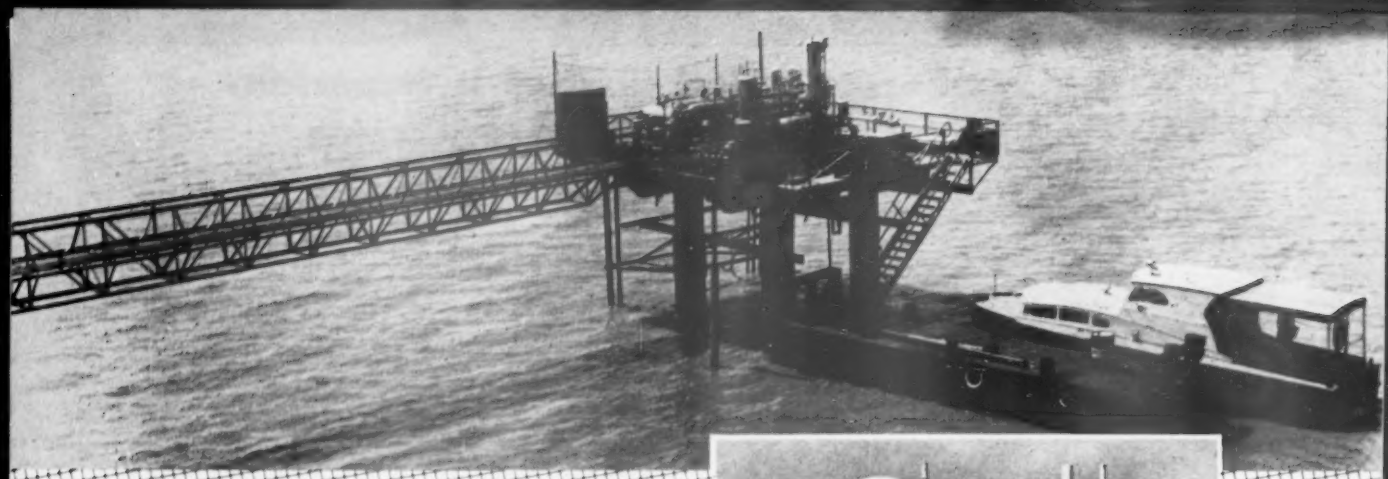
OIL AND GAS SEPARATORS

CHRISTMAS TREE FLOW MANIFOLDS

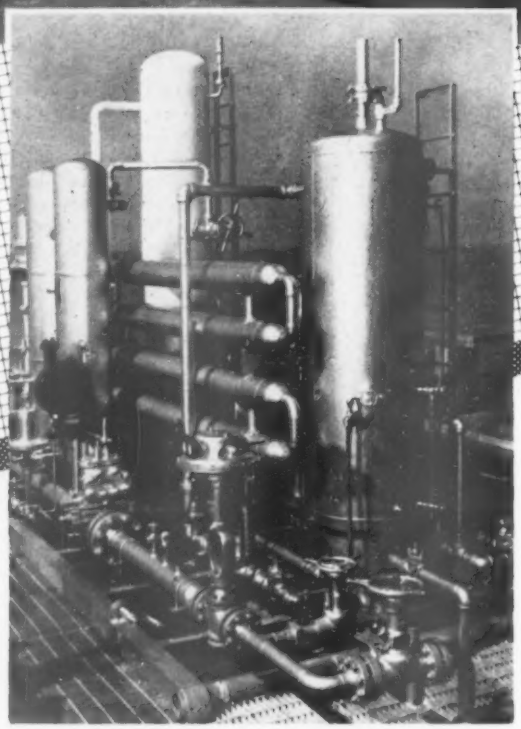


HEATERS AND TREATERS

THORNHILL-CRAVER COMPANY • P. O. BOX 1184 • HOUSTON, TEXAS



Engineered for individual installations PARKERSBURG HYRECO assures maximum benefits of cold separation



The outstanding and proven performance of Parkersburg Hyreco Gas Processing Units is the result of installations being engineered to meet the producing conditions of individual wells. Parkersburg engineers, specializing in cold separation, carefully analyze the conditions of your well and from this data they combine the standard elements of Hyreco into the one assembly that will deliver maximum efficiency on your well. Only the wide range and extreme flexibility of Hyreco, plus Parkersburg's technical experience and engineering skill, makes this individual installation designing possible.

Talk to your nearest Parkersburg representative for individually engineered Hyreco installations for your wells.

This off-shore installation of a 10MMCF Hyreco Unit is giving trouble-free performance and maximum efficiency, even though it frequently must operate at 20% above its rated capacity.

P.S. Parkersburg Service means research and engineering, consultation and technical proficiency for the development of improved products and processes for the oil and gas industry.

8403

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PARKERSBURG
OIL FIELD EQUIPMENT

The Parkersburg Rig & Reel Co. Parkersburg, West Virginia
Division of Parkersburg-Aetna Corporation

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • KNOCKOUTS • SCRUBBERS • TREATERS • HEATERS

We make our own steel

The quality control no other bearing manufacturer can give you

TO find steel good enough for Timken® bearings, we had to go into the steel business ourselves.

Because we're the only bearing company that makes its own steel, we're the only one that can control bearing quality every step of the way—from melt shop through final bearing inspection. It's by far our costliest and most important quality control.

Equipped with nine huge electric furnaces, three of them brand new, our mill is as advanced as science can make it. Our steel research staff is constantly searching for ways to make Timken bearing steel better. For instance, we were the first company to analyze steel with a direct-reading spectrometer for split-second control of the melt.

Making our own steel is only one of the scores of production, control and inspection steps we employ to make Timken bearings the finest. To be absolutely sure of the highest performance standards in the equipment you build or buy, always specify Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ◫→ LOADS OR ANY COMBINATION ◫↗

CENTURY MOTORS

....SIMPLE, FAITHFUL, FOOLPROOF

The Century Electric Motor is one of those most difficult of all things to engineer — a simple, foolproof piece of equipment.

The Century never bothers about rain or snow or temperatures. It's just a workhorse that puts its weight in the collar and keeps it there.

You see these motors everywhere in the oil fields, faithfully at work. We like to sell them because they fit in so well with J&L policies.

Get more satisfaction from your next electric motor — specify a Century!

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION
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Serving The United States and Canada
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P·E·S·A
PARTNERS IN PETROLEUM PROGRESS

Your drilling operation continually profits from BAROID'S unequalled mud experience . . . .

Bulk Baroid Facilities Expanded!

After 3 years successful use in the TEXAS GULF COAST

"Bulkan"—two-and-one-half-ton capacity—for delivery of Bulk Baroid to water jobs.

CONVENIENT, labor-saving Bulk Baroid distribution is now available to Southern Louisiana, following three years of successful operation on the Texas Gulf Coast.

The pioneering phase of Bulk Baroid distribution methods was done with the cooperation of Baroid distributors on the Texas Gulf Coast. These distribution methods make Bulk Baroid practical and economical for both land and water jobs where large quantities of weight material are required in the Louisiana-Texas Gulf Coast area.

The efficiency of the semi-automatic Bulk Baroid rig storage tanks resulted from the flexible, accurate air-gravity metering system developed by Baroid engineering. This system feeds dry weight material from the storage tank to the wet mud system in pre-determined amounts, at rates from 1 to 20 tons per hour. The entire bulk handling system prevents waste, and the rig storage tanks save time and labor.

A typical Bulk Baroid distribution station.

. . . another proof of how you profit from Baroid's quarter-century of pioneering and research engineering in the scientific use of drilling mud . . . for better mud control, greater drilling safety, lower drilling costs.

you can rely on Bulk Baroid

Bulk Baroid available from eight storage points in the Louisiana-Texas Gulf Coast oil areas.

BAROID SALES DIVISION • NATIONAL LEAD COMPANY • P. O. Box 1675, Houston 1, Texas

Reliable data scientifically obtained . . . a down-hole picture of your well

A SUB-SURFACE log is as reliable as the skill and equipment used to obtain it . . . and the scientific knowledge used to analyze and evaluate the down-hole data.

Baroid Well Logging Service has, for 14 years, provided oil operators with *reliable* formation data fast, while the bit is making hole. It detects every show of oil and gas . . . without the cost of coring every drilling break. Baroid Mud and Cuttings Analysis means coring only when mud and cuttings returns indicate possible production.

This complete down-hole logging service, including lithology, drilling rate and depth, plus on-location core analysis, means faster drilling, lower costs.

Ask your Baroid field man or call the Baroid Well Logging Office in your area for complete details on this additional Baroid service to the drilling industry.

you can rely on **Baroid's**

Well Logging Service

BAROID

Baroid Sales Division — National Lead Company ☆ Main Office: P. O. Box 1675, Houston 1, Texas

WELL LOGGING OFFICES — LOUISIANA: Shreveport, New Orleans; TEXAS: Corpus Christi, Houston, Midland; OKLAHOMA: Oklahoma City; CALIFORNIA: Los Angeles; WYOMING: Casper; MONTANA: Billings; CANADA: Calgary, Alberta.

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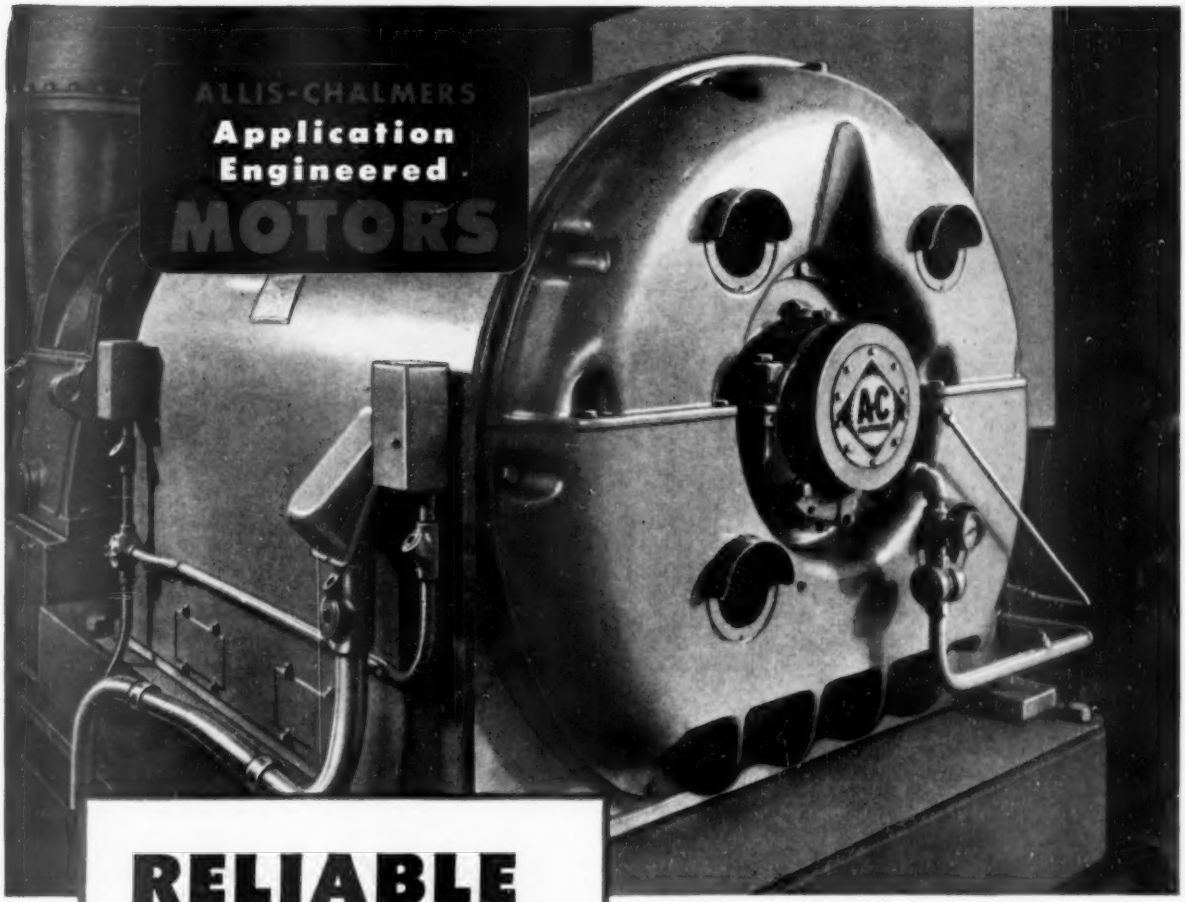

Frontier Oil Refining Company uses a 3000-hp, 4160-volt, 1790-rpm Allis-Chalmers cage motor to drive an Allis-Chalmers 4-stage centrifugal main air blower at its Buffalo, New York, refinery.

RELIABLE LOW-COST Air *for Fluid Catalytic Cracking Units*

Motor-driven installations have proved that modern electric power systems can provide the service reliability required for catalytic cracking blower and compressor drives. And they can do the job cheaper than steam turbine drives in most cases.

Initial investment savings of $500,000 have been reported. Maintenance costs are significantly lower. Relative operating costs, while determined by prevailing power rates and other factors, are often lower for electric drive installations.

Allis-Chalmers can supply synchronous or induction motors engineered to meet any FCCU requirements. Both types are available in drip-proof, splash-proof, pipe or forced-ventilated, totally-enclosed fan-cooled, and explosion-proof designs. All are built for maximum dependability plus ready accessibility for inspection and maintenance.

Your nearby A-C representative can help you determine the relative merits of steam and electric drives for specific applications. Allis-Chalmers, Milwaukee 1, Wis.

A-4295

ALLIS-CHALMERS

Harper Machine Screws

WHY WASTE YOUR DOLLARS BY SAVING YOUR PENNIES?

Avoid equipment breakdown—repair troubles. Use Harper Everlasting Fastenings designed to stop corrosion. Their additional cost is usually only a few pennies—pennies wisely spent to protect oil field and refinery machinery against sour crudes—salt spray—severe weathering.

With Harper Fastenings, you assure customers of corrosion-free operation, extra-dollar performance. And they're quickly available—Harper stocks over 7,000 different types and sizes of bolts, nuts, screws, washers and rivets. For special applications, a large staff of metallurgists and engineers is ready to help you work out the problem.

Behind Harper is the longest specialized experience with corrosion-resistant fastenings. As the world's largest exclusive producer in the field, Harper offers you the advantages of one account to keep—one order to write—one bill to pay.

Call your Harper Branch Office or Distributor—or write for helpful, additional information.

The H. M. Harper Company
8208 Lehigh Avenue, Morton Grove, Illinois

SPECIALISTS IN ALL CORROSION-RESISTANT FASTENINGS

STAINLESS STEELS
MONEL
NICKEL
BRASS
NAVAL BRONZE
SILICON BRONZE
COPPER
ALUMINUM

AERO DIVISION
FASTENINGS OF HIGH TEMPERATURE ALLOYS

Fit Tenite plastic pipe with a saw, slip-sleeve joints, cement and brush

Fitting and laying tough Tenite plastic pipe is quick and easy. For example, the pipe is sawed to size, solvent cement is applied to the pipe ends and a thinner to the slip-sleeve coupling; the two ends are then forced into the slip-sleeve coupling to form the joint. In a typical installation, three men easily laid 4000 feet of 4" Tenite pipe in a day; usually eight men are required to lay the same amount of steel pipe.

Extruded of Tenite Butyrate plastic, the pipe offers unusual corrosion resistance to sour crudes, salt water and electrolytic action.

The extremely smooth interior surface of Tenite pipe minimizes shutdowns due to paraffin-clogged lines. Lower frictional resistance enables Tenite pipe to deliver about 40% more fluid for any given head loss than clean steel pipe of the same diameter.

Tenite pipe is made by various companies to which Eastman supplies the plastic compound. Send the coupon for our descriptive booklet and list of Tenite pipe suppliers. If you need assistance in adapting Tenite pipe to your operation, our technical staff will be glad to help.

For corrosion resistance ask for PIPE MADE OF—

TENITE
BUTYRATE
an Eastman plastic

●EASTMAN CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE
Subsidiary of Eastman Kodak Company

EASTMAN CHEMICAL PRODUCTS, INC.
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Please send me further information about TENITE BUTYRATE PIPE

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Wherever your operations are located in Texas, western Louisiana, or New Mexico, the strategically placed repair shops of Waukesha Sales and Service, Inc., mean that you are close to the best in fast, economical repair facilities. Set for service on your Waukesha Engine or Kohler Electric plants and air-cooled engines, take advantage of our personalized attention that keeps your operations running smoothly and reduces your downtime to a minimum.

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with both Electric Weld and Seamless Casing and Tubing

FOR shallow wells, medium wells, deep wells, you'll find casing and tubing by Republic that can do the job.

Electric Weld Casing and Tubing have been widely used by the oil and gas industries for the past twenty-five years in shallow and medium wells all over the world. They are manufactured in sizes 2⅜" to 13⅜", grades H-40 and J-55.

Republic Seamless Casing and Tubing are now being produced at our new plant on the Calumet River in Chicago, easily accessible for shipping to oil fields anywhere. The latest manufacturing techniques plus Republic's rigid quality control from ore to finished product assure seamless products second to none. Seamless sizes range from 2⅜" through 9⅝", grades J-55 through N-80.

When you order casing and tubing . . . for any depth . . . keep these two things in mind: you get Republic quality plus shipping facilities. And you can get both seamless and electric weld products from one source. For more information, call your nearest Republic Sales Office. Or write to:

For a quick picture trip through Republic's new Seamless Mill, write for this new 24-page booklet. Ask for No. ADV-595.

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REPUBLIC CASING AND TUBING
Electric Weld and Seamless

Other Republic Products include Line Pipe—Steel and Plastic Pipe—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

FASTER
FASTER
FASTER

SOCONY-VACUUM

And Still the Flying Red Horse Keeps Pace!

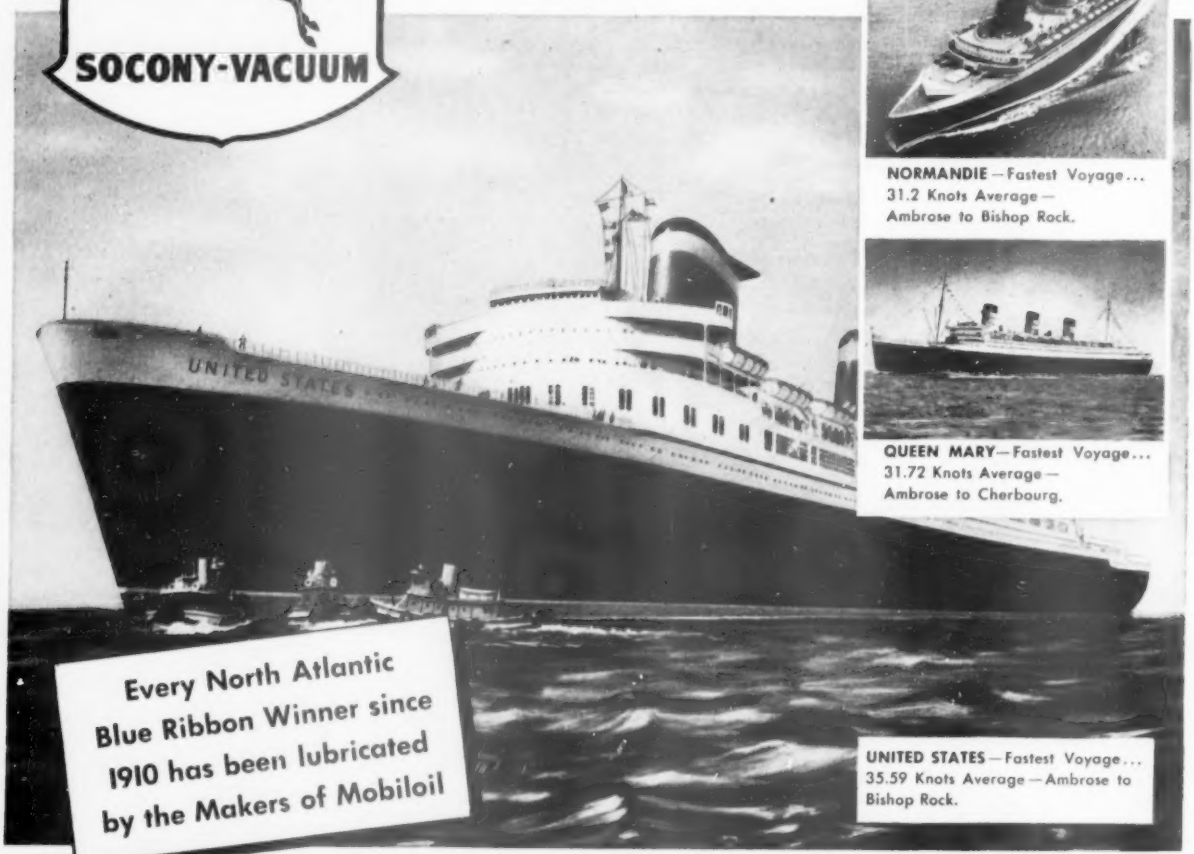
Some Blue Ribbon Winners of the Past!

MAURETANIA—Fastest Voyage... 26.25 Knots Average—Ambrose to Cherbourg.

BREMEN—Fastest Voyage... 27.83 Knots Average—Cherbourg to Ambrose.

NORMANDIE—Fastest Voyage... 31.2 Knots Average—Ambrose to Bishop Rock.

QUEEN MARY—Fastest Voyage... 31.72 Knots Average—Ambrose to Cherbourg.



Every North Atlantic Blue Ribbon Winner since 1910 has been lubricated by the Makers of Mobiloil

UNITED STATES—Fastest Voyage... 35.59 Knots Average—Ambrose to Bishop Rock.

SOCONY-VACUUM OIL COMPANY, INC.

and Affiliates:

MAGNOLIA PETROLEUM COMPANY • GENERAL PETROLEUM CORPORATION

CHECK 'EM OFF

THE INSIDE REASONS FOR MACK'S STAND-OUT $$$ EARNING POWER

Keeping going under conditions that stop other trucks cold—carrying big payloads . . . on fast schedules . . . in the roughest operations—that's what points up the ability of Mack trucks to build greater profits for you.

WHEREVER YOU SEE A TOUGH JOB . . .
THERE IS WHERE YOU SEE MACKS

Mack TRUCKS

Mack Trucks, Empire State Building, New York 1, N.Y. Factory Branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

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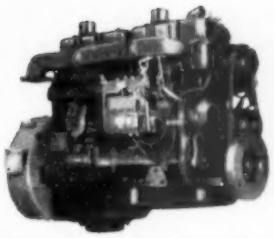
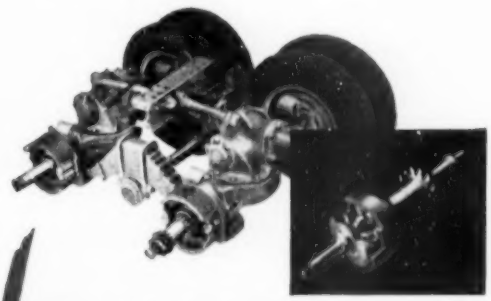
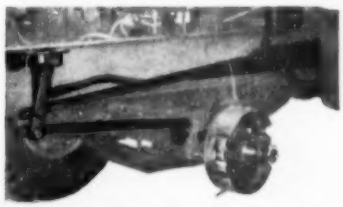


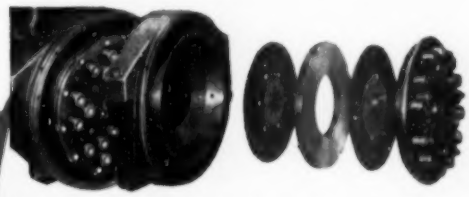
Plentiful Horsepower. Mack provides the right powerplant, gasoline or diesel, to haul most efficiently, most profitably for each specific operation. Complete range of engine options up to 400 horsepower. Coupled with the most rugged transmission or torque converters yet developed.



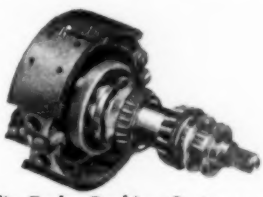
Balanced Bogie With Power-Divider. Only Mack six-wheelers offer the unique advantage of Mack's Balanced Bogie, incorporating the exclusive Power-Divider. With the Mack Power-Divider torque is distributed between bogie axles in proportion to traction, thus enabling Macks to pull through where other trucks mire in.



Power-Steering. Hydraulic power-steering permits effortless, fast steering and positive, shockless control.



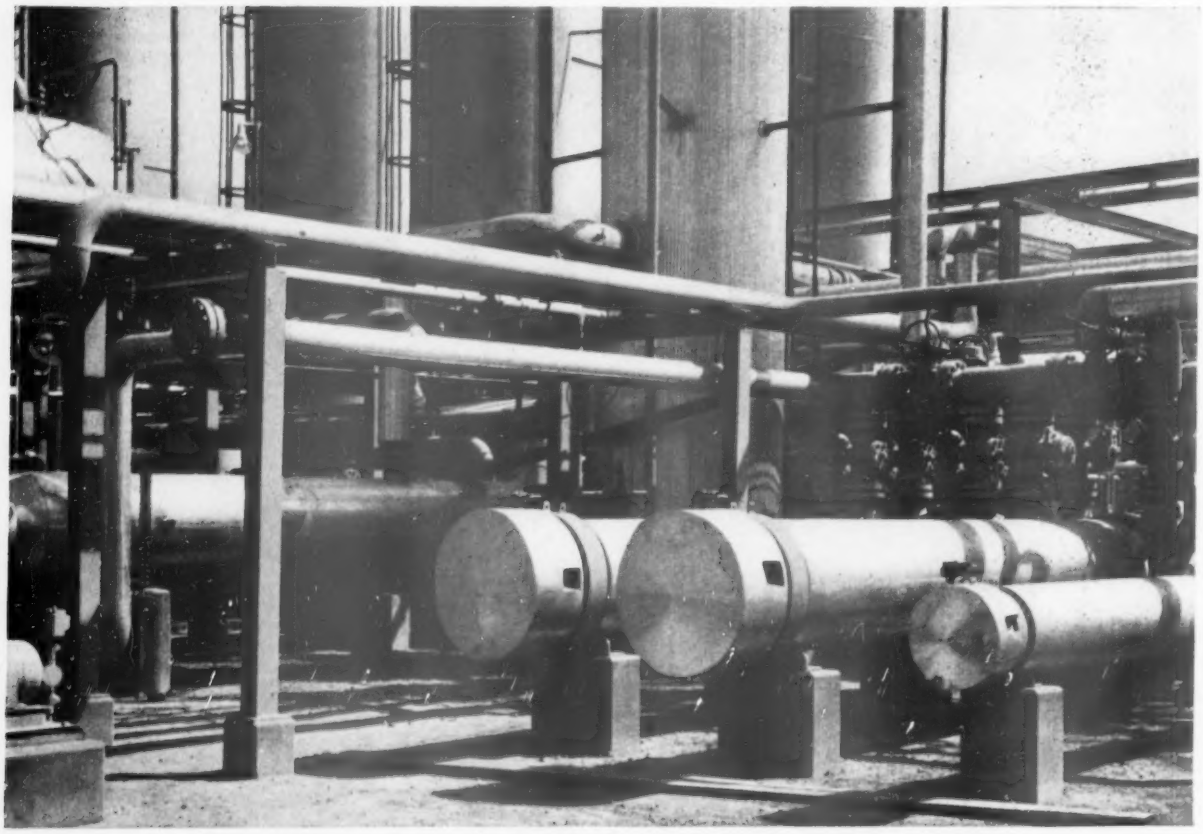
Air-Assist Clutch. Operation of the big, double-plate clutch is virtually effortless, reduces driver fatigue.



Hydraulic Turbo-Braking Systems and powerful air-actuated brakes provide utmost safety for down-hill going, assure safe and positive driver control at all times.

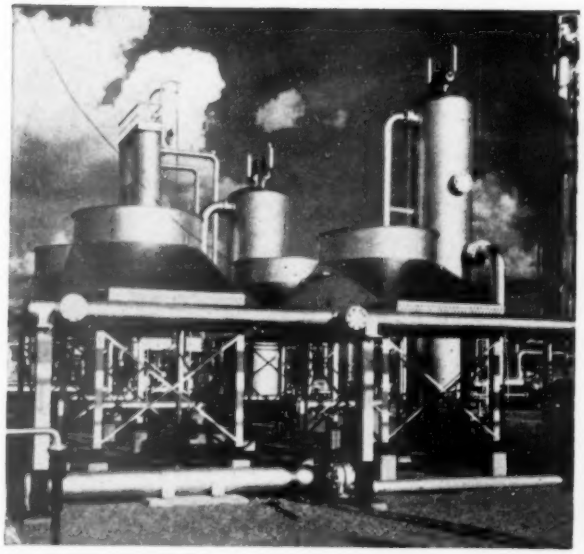
Profit-building answers to Modern

...examples of the wide variety of heavy-metal equipment designed and built by Alco to meet today's demands in petroleum and petrochemical processing . . . results of **Alco Experience** . . . gained through many years of designing and building heavy-metal equipment for refining and processing companies the world over . . . and **Alco Facilities** . . . capable of handling economically an extremely wide range of metal-fabricating operations . . . of meeting strictest customer requirements.

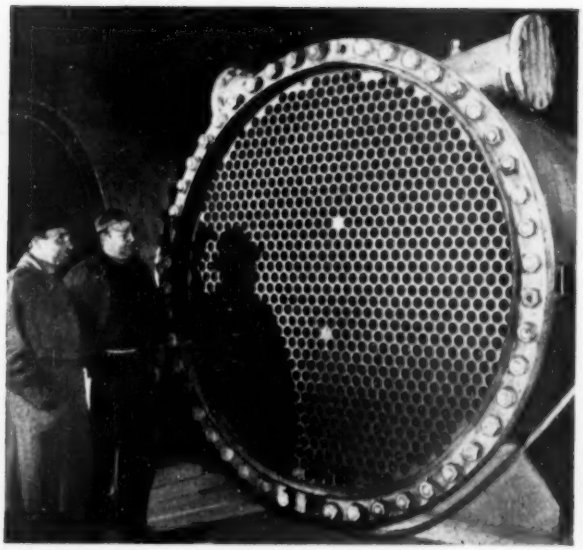


ALCO FEED EXCHANGERS AND REBOILER heat the product stream to the de-ethanizer column at Lion Oil Company's Diamond M-Sharon Ridge gasoline plant in Scurry County, Texas, "The richest county west of Fort Worth." All shell-and-tube heat-transfer equipment at this new, 50,000,000 cu ft-capacity plant is Alco built.

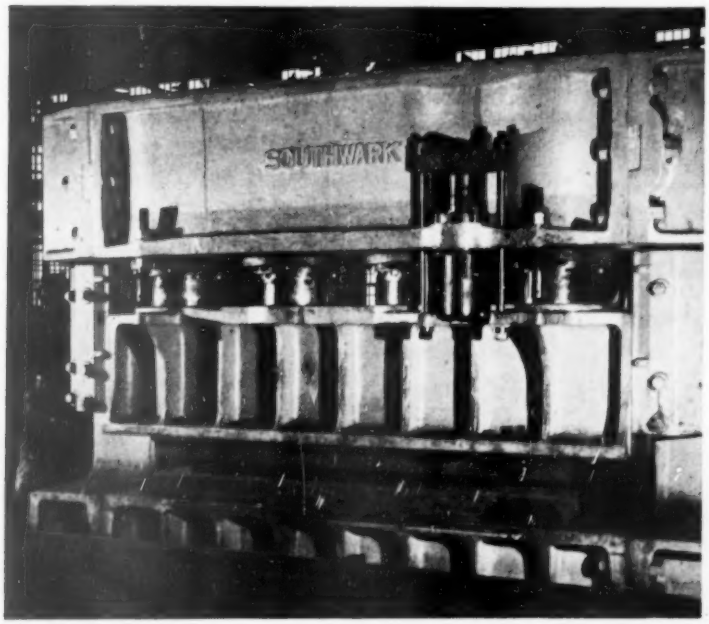
Processing problems



ALCO AIRCOOLERS help cut cooling costs at Sun Oil Company's pressure maintenance station at Allison Ranch, Texas. These modern, high-efficiency units are ideal answers to cooling problems caused by insufficient water supply or high relative humidity affecting evaporative units.



EXHAUST GAS COOLERS custom-engineered by Alco are part of the extensive facilities for testing supersonic aircraft, guided missiles and aircraft engines at the new Arnold Engineering Development Center at Tullahoma, Tenn. Also installed at the Center are 25,000 ft of Alco Steel Pipe.



SCORES OF PROFIT-BUILDING ANSWERS to modern processing problems have taken shape on this large press at Alco's 31-acre Dunkirk plant. This is just one of the many special machines that enable Alco to meet your strictest specifications—quickly and economically.

How about your own processing problems? Is heavy-duty equipment a factor? If so, contact your nearest Alco Products sales representative today—as the first step toward profit-building answers. Offices in Dunkirk, New York, Chicago, Los Angeles, Kansas City, Houston, Tulsa, and Beaumont.

ALCO
PRODUCTS

AMERICAN LOCOMOTIVE COMPANY • DUNKIRK, N. Y.

NEW CHEVROLET TRUCKS

do more work per *day* . . . more work per *dollar* on every type of hauling or delivery job!

Time and money are the two most important factors in any trucking job—and the new Chevrolet trucks for '54 are built to save more of *both!*

THEY SAVE YOU TIME ALL THE TIME

Whether you deliver door-to-door or haul state-to-state, new Chevrolet trucks will speed up your schedules. They bring you new hour-saving engine power—greatly increased acceleration and hill-climbing ability. You save time with greater safety . . . and *without* increasing your maximum road speeds. In traffic or on delivery routes, new truck Hydra-Matic transmission* saves time, and saves driving effort as well. It's the last word in no-shift truck driving.

THEY SAVE YOU MONEY IN *EVERY* WAY

Along with increased power, these great new trucks bring you increased operating economy. You enjoy hefty gasoline savings in every model, thanks to new high-compression performance. In addition, you save on upkeep and maintenance. That's because you get extra strength and stamina in drive line and chassis. There are heavier axle shafts in 2-ton models, newly designed clutches and stronger frames in all models.

See your Chevrolet dealer for all the facts about the "savingest" Chevrolet Advance-Design trucks ever built! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

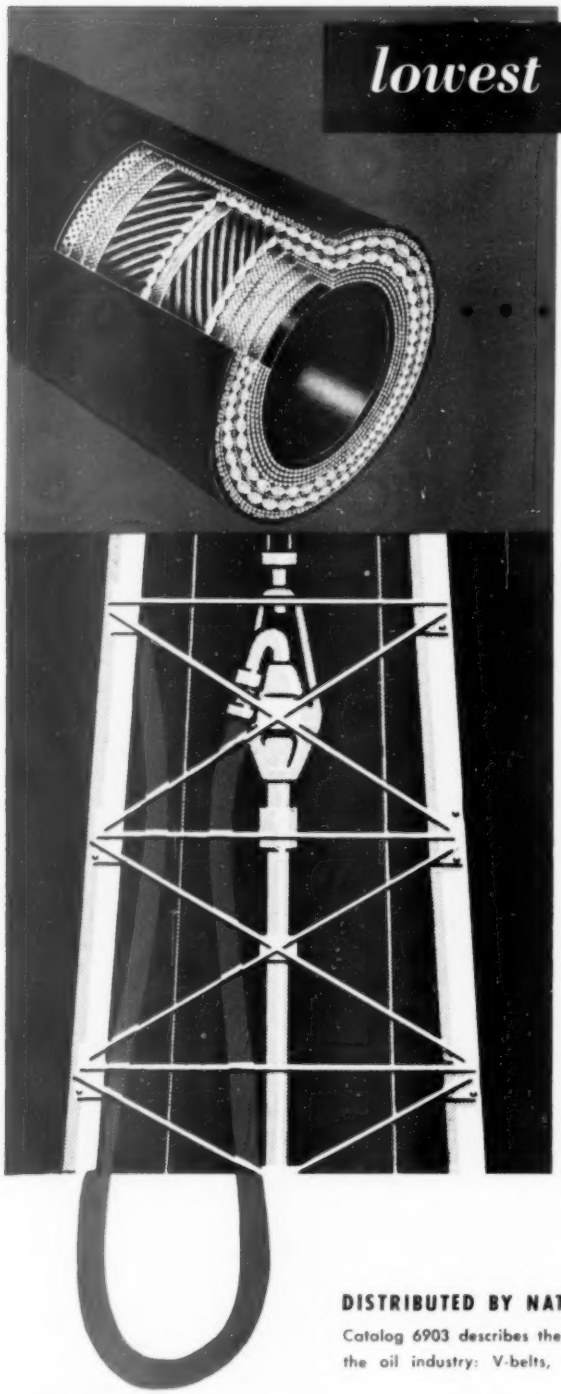
MOST TRUSTWORTHY TRUCKS ON ANY JOB!

CHEVROLET

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates backrubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cab models, "Jobmaster 261" engine on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*



lowest cost per foot drilled

more use per dollar from RAY-MAN CBL ROTARY HOSE

Important engineered features in Ray-Man CBL Rotary Hose permit longer, trouble-free drilling—at lower rig costs. Special high-tensile steel cable wire reinforcement precision wound makes Ray-Man *stronger, safer* to use and handle . . . *easier* to transport and rig-up without accident. With strong, flexible cable strength member, Ray-Man CBL resists kinking, and returns to full roundness under pressure when crushed. Improved built-in coupling features blow-out proof "Lip-Lok" seal that tightens under high pressure. These features of Ray-Man CBL Rotary Hose give you the highest safety factor, longest life, lowest cost per foot drilled . . . "More Use Per Dollar."

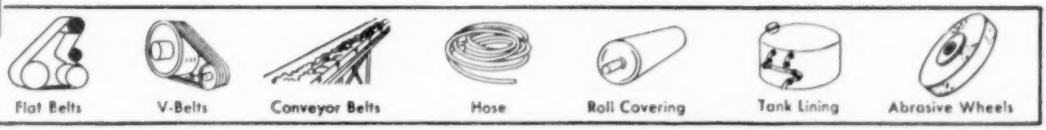
DISTRIBUTED BY NATIONAL SUPPLY COMPANY IN ALL PRINCIPAL OIL FIELDS

Catalog 6903 describes the complete line of Raybestos-Manhattan rubber products for every phase of the oil industry: V-belts, transmission belts, oil-loading, and refinery hose. Write for your copy.

R/M

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

RM 4/5

For its North Dakota products line the
Standard Oil Company (Indiana) selected

New Light-weight, reinforced

TRANSHIELD

ASBESTOS PIPE LINE FELT

Stretching a distance of 200 miles from Mandan, N. D. to Moorhead, Minn., the new products pipe line will provide a valuable link connecting the new Mandan refinery with the mid-western products pipe line system of the Standard Oil Company (Indiana).

Permits high speed wrapping...
assures effective protection for enamels

On the job shown above, coating and wrapping rates up to 17,000 feet per day were reported. This remarkable record is a tribute to Transhield's special tear-free reinforcement. This reinforcement is accomplished through the use of continuous glass yarns, parallel spaced on ¼" centers.

Designed for average soil conditions, Transhield is a light-weight felt composed of coal-tar saturated asbestos. This time-tested material assures an efficient barrier between pipe line enamels and earth loads . . . soil stresses.

As an outer sheath to retard cold flow, Transhield takes advantage of the full thickness of the enamel coating—working effectively toward preserving a continuous film of enamel on the pipe line.

Long-Length Rolls—Available in 800-ft. rolls (14" O.D., 2" I.D.) for traveling power-driven coating and wrapping machines. Other lengths can be furnished to suit your method of application. Widths are from 2" to 36".

Johns-Manville has developed three wrapping materials for pipe line protection:

J-M 15-lb. Asbestos Pipe Line Felt (perforated or unperforated)—for severe soil conditions.

J-M Transhield Asbestos Pipe Line Felt—for average soil conditions.

J-M Trantex polyvinyl pressure sensitive tape—for pipe line corrosion protection where ease of application is important such as when coating field joints of mill-wrapped pipe or making emergency pipe line repairs.

For further information write Oil Industry Department Johns-Manville, Box 60, New York 16, N. Y.

JOHNS MANVILLE JM PRODUCTS

Johns-Manville ASBESTOS PIPE LINE FELT

MADE FOR RUGGED OIL COUNTRY SERVICE

SPANG® CW STEEL PIPE

- for air lines
- for gas lines
- for water systems
- for water flooding lines
- for oil gathering systems
- for salt water disposal lines

Looking for service pipe to stand up under rough oil country conditions? Then take a look at SPANG CW (Continuous Weld) Steel Pipe.

SPANG CW is made of top grade steel . . . is quality-controlled during manufacturing . . . has strong, clean, uniform welds and a smooth, clean finish. SPANG CW Pipe is uniform in diameter . . . is thoroughly inspected and tested before leaving the plant . . . can withstand pressures up to 1700 lbs. psi.

This care in processing SPANG CW Pipe produces a rugged product . . . built for oil country installations . . . offering you long, dependable service life. Try it on your operations.

You can get SPANG CW Steel Pipe in a full range of sizes at any National Supply Store.

SPANG-CHALFANT DIVISION

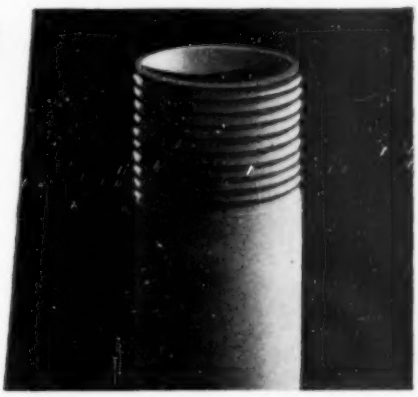
THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

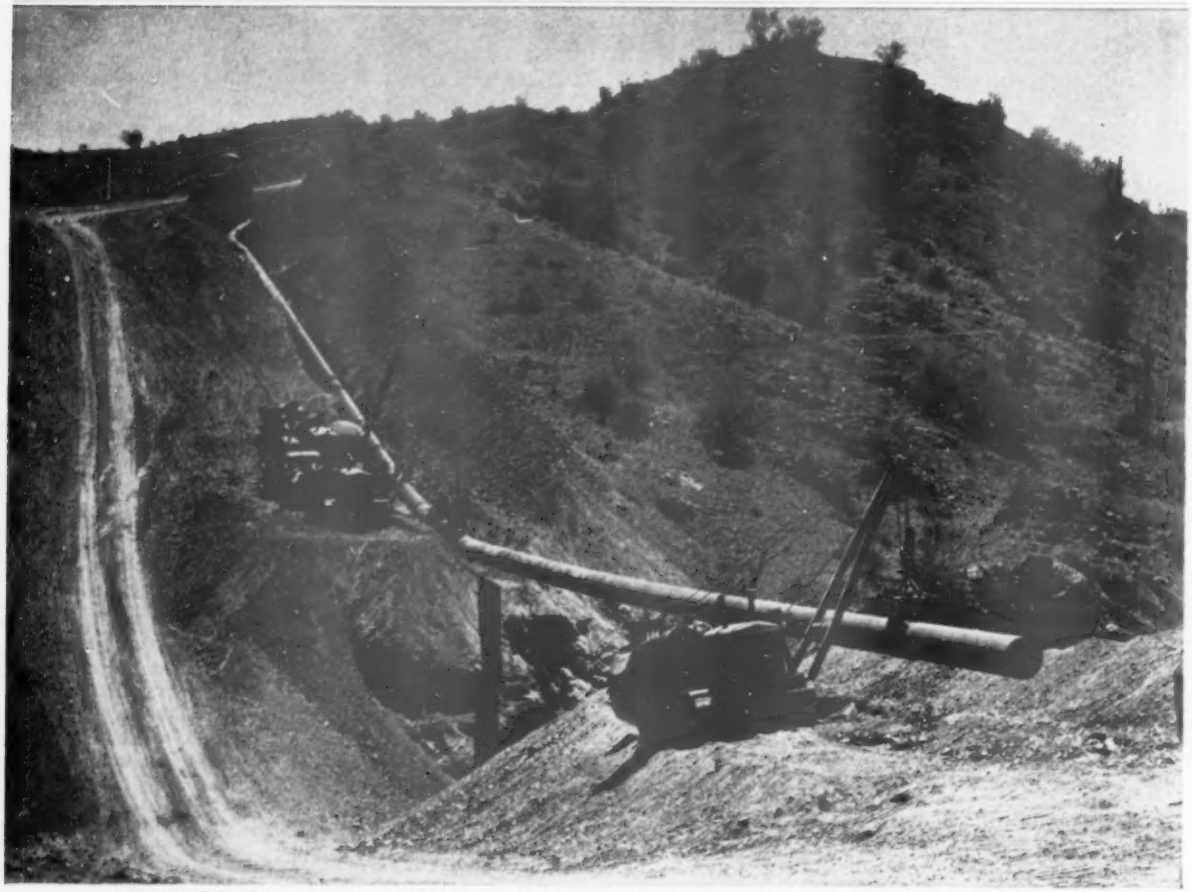
DIVISION TUBULAR OFFICES: Denver, Colorado • Houston, Texas • Fort Worth, Texas • Los Angeles, California Pittsburgh, Pennsylvania • Tulsa, Oklahoma • Calgary, Alberta, Canada

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

NATIONAL BLUE PRODUCTS



PIPE LINE PROGRESS



30-inch A.O.Smith line pipe being cradled into position in a New Mexico spread of El Paso Natural Gas Company project.

New El Paso Natural Gas line absorbs more than 300 MILES OF 30-INCH A. O. SMITH LINE PIPE

Essential additional gas volume for California, Arizona, New Mexico and west Texas is now being provided through construction of new pipe line facilities by El Paso Natural Gas Company.

More than 300 miles of high-strength, 30-inch, thin-wall, internally expanded line pipe were furnished by us for this project which was completed in January, 1954.

El Paso Natural Gas Company's new line will carry gas from the Permian Basin of southeastern New Mexico and west Texas, and from the San Juan Basin of northwestern New Mexico and southwestern Colorado across New Mexico and Arizona to the Colorado River on the California border.

The 30-inch pipe line was started during July, 1953, and will be put into service the first part of 1954 . . . another pipe line conquest of rough terrain, desert, mountains and canyons.

A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters.

The A.O. Smith Casing Mill is operating at capacity to supply vitally needed casing for the Oil and Gas Industry.

DEPENDABILITY through RESEARCH and ENGINEERING

A.O.Smith CORPORATION

LINE PIPE • CASING

Chicago 4 • Dallas 2 • Denver 2 • Houston 2 • Los Angeles 22
Midland 5, Texas • New Orleans 12 • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • Tulsa 3 • Washington 6, D.C.
International Division: Milwaukee 1

Lifeline for industry

THE VAST NETWORK of pipe lines criss-crossing America are actually *lifelines* . . . for they transmit gas, oil and water essential to industry.

For the past four years we have been helping to extend these lifelines by shipping more than 24,000 carloads of Basalt-Kaiser Steel pipe to major projects throughout the country. This is enough to build a pipe line from Juneau, Alaska to The Panama Canal.

All of this steel pipe has been delivered *on time.*

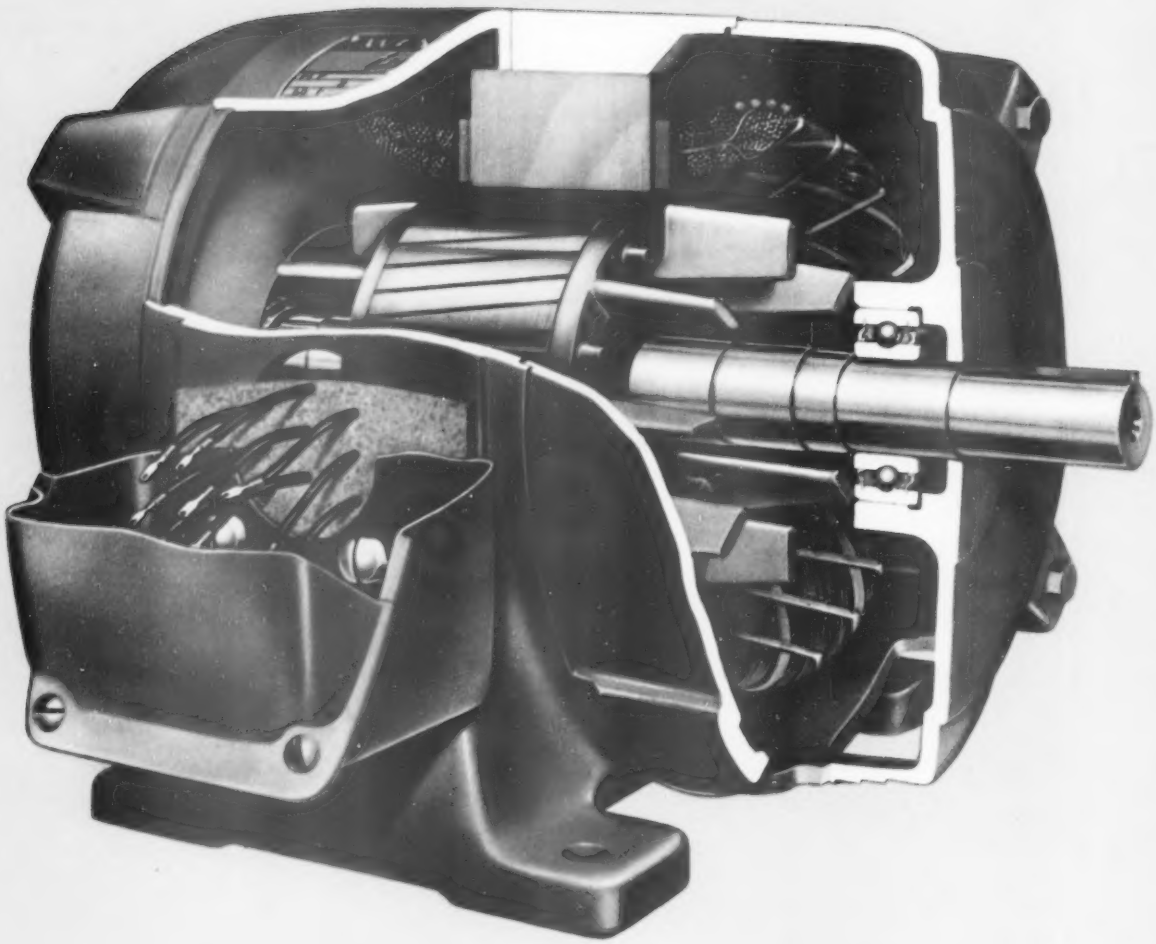
This dependable delivery—plus *uniform quality, wide range of sizes,* and *prompt service*—is another reason why experienced pipeline companies know they can rely on Kaiser Steel.

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

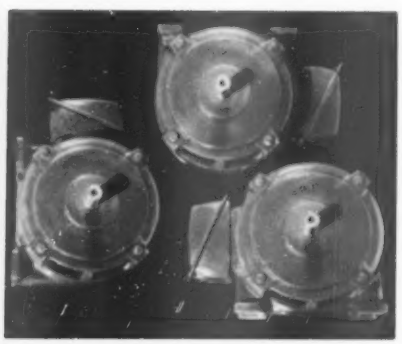
Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York



New 4-WAY SEAL, pre-lubricated bearing means lower maintenance costs. Another step ahead in bearing design. A SEALED, PRE-LUBRICATED bearing with *two* protective seals on *each side*. Stationary inner seals form labyrinth joints. Rotating outer seals act as flingers. This bearing has all the advantages of the original Life-Line sealed bearing—*plus extra protection.*

New FORTIFIED INSULATION means longer motor life. Another step ahead in motor insulation. MYLAR*, a new slot insulation with greater dielectric and mechanical strength. BONDAR, a new wire insulation with more heat resistance . . . longer life. BONDITE, a new stator insulation with greater strength to withstand attacks from destructive elements.

*Trademark for DuPont polyester film



New PROTECTED HOUSING means dripproof in any position. Another step ahead in motor protection. End-bracket openings are located in the underquadrant for maximum protection. Brackets can be rotated 90° or 180° for wall or ceiling mounting. Circumference of motor frame is *completely enclosed* so that it remains dripproof in *all* mounting positions.

The new Life-Line A motor
...the big step ahead by Westinghouse

Here it is . . . the new Life-Line® "A" motor. A new motor that steps ahead to lead the industry. A new motor that reflects the continuing engineering and manufacturing leadership of Westinghouse. A new motor that gives you . . .

Greater protection
Greater application flexibility
Smoother, quieter operation
Lower maintenance costs
Fewer motor outages
Longer motor life

The new Life-Line "A" motor is still a step ahead of the industry. How? Through balanced design and proved performance. Look at the improved materials and advanced mechanical and electrical components—each one matched to its neighbor.

New? Yes, but not untried. The new Life-Line does not discard the past . . . instead it profits by it and builds upon it. Each component of the new Life-Line has been screened in the laboratory, then proved on production-line motors. You're not buying "theoretical" performance. The new Life-Line motor, is a proved Life-Line.

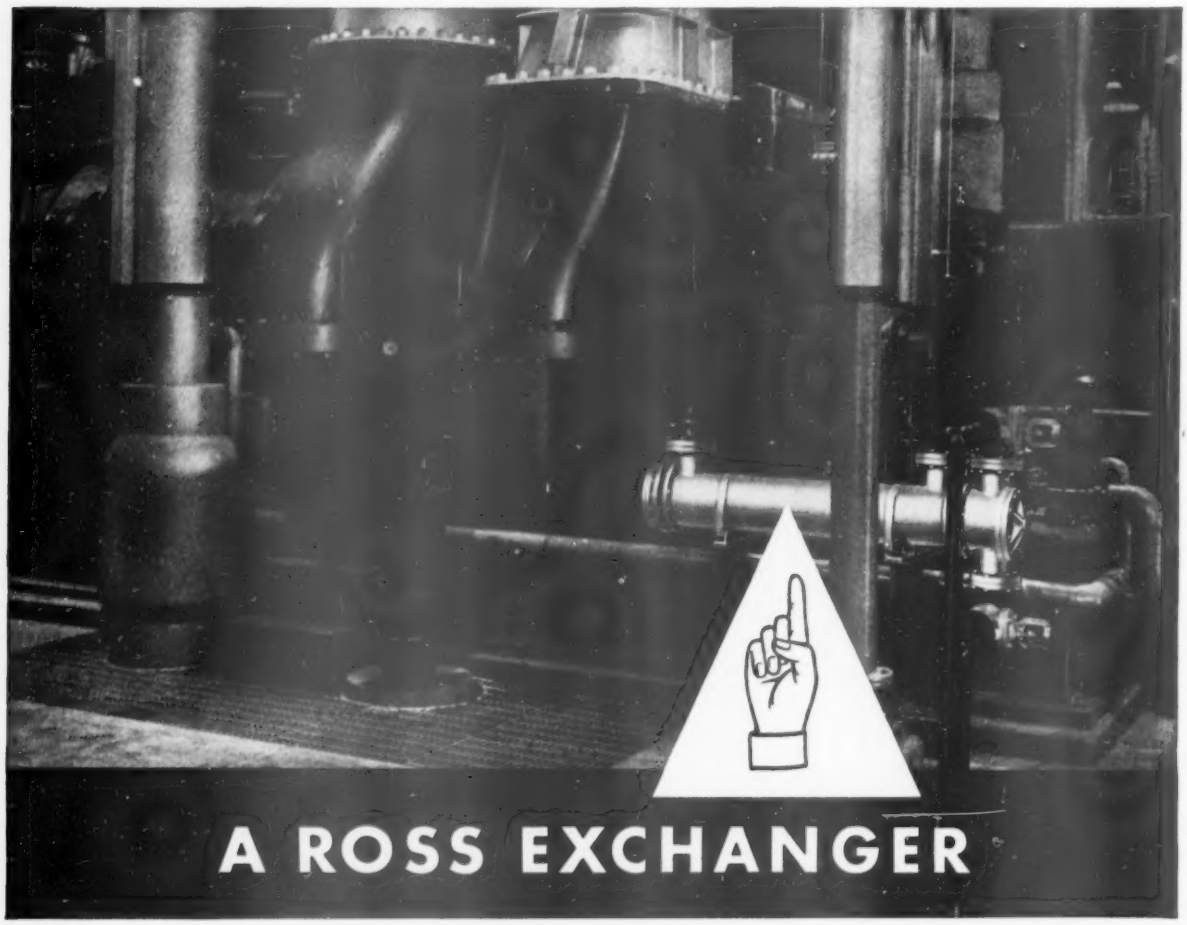
J-21846

GET THIS FREE BOOK

Here are all details on the new Life-Line "A" motor. Read about the new insulating materials—the new stator core—the new cooling methods—the new precision manufacturing techniques. Write for your free copy of Booklet B-6154. Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Penna.

YOU CAN BE SURE...IF IT'S
Westinghouse

For close control of lube oil temperature in this Ingersoll-Rand Turbo-Blower



Designed for wide range performance in gas booster service, this Ingersoll-Rand Turbo-Blower was installed by the Pacific Gas and Electric Company to meet increasing peak loads in the San Francisco area.

Rated at 30,000 cfm, the four-stage blower is driven by a 2,395 hp I-R Turbine at 4500 rpm. Controlling the lube oil temperature is a Ross Type CP Exchanger. Overheating is most dependably prevented.

"We never have trouble with Ross units . . . the fact that they are more or less standard on certain of our lines means they are entirely satisfactory," states Ingersoll-Rand.

Regularly selected for their top-rated thermal performance, Ross Exchangers are used extensively in the petroleum, gas and chemical industries on numerous types and makes of prime equipment: engines, compressors, speed increasers, centrifugal pumps, transformers and hydraulic equipment, to mention a few.

Assembled from mass produced parts and sub-assemblies to fully standardized, pre-engineered designs, Ross Type CP Exchangers are promptly available to meet most requirements. For detailed information, request Bulletin 2.1K1.

KEWANEE-ROSS CORPORATION

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

1417 WEST AVENUE • BUFFALO 13, N. Y.

In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

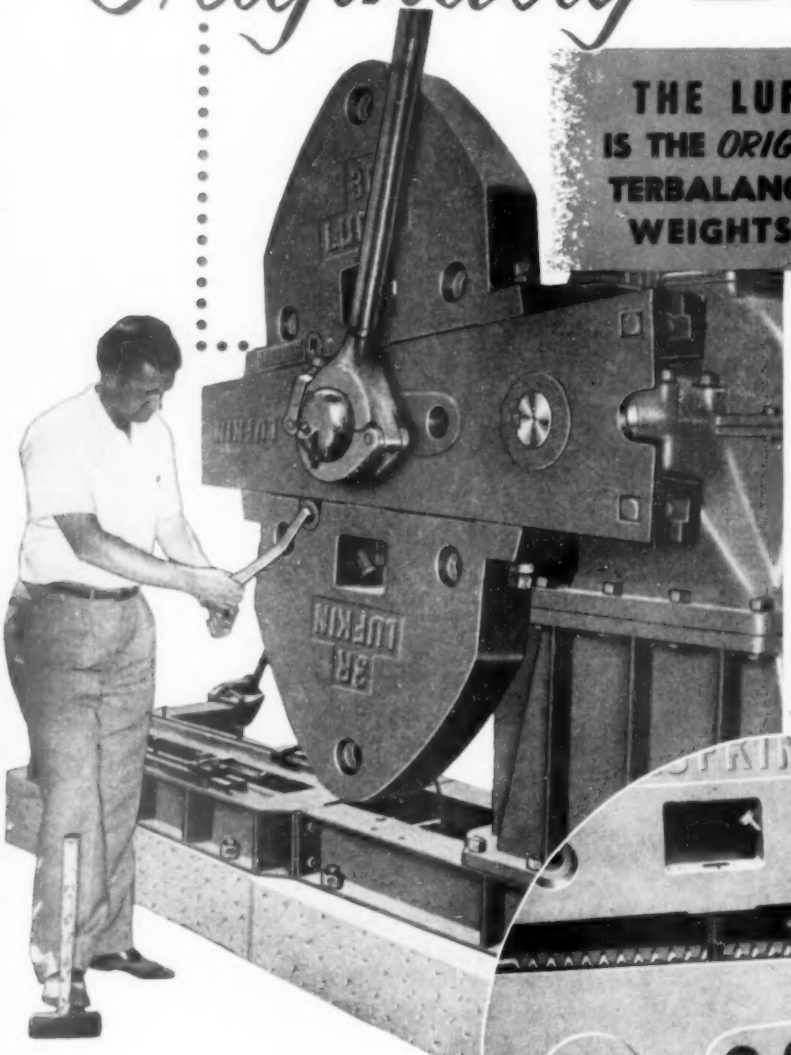
Originally LUFKIN

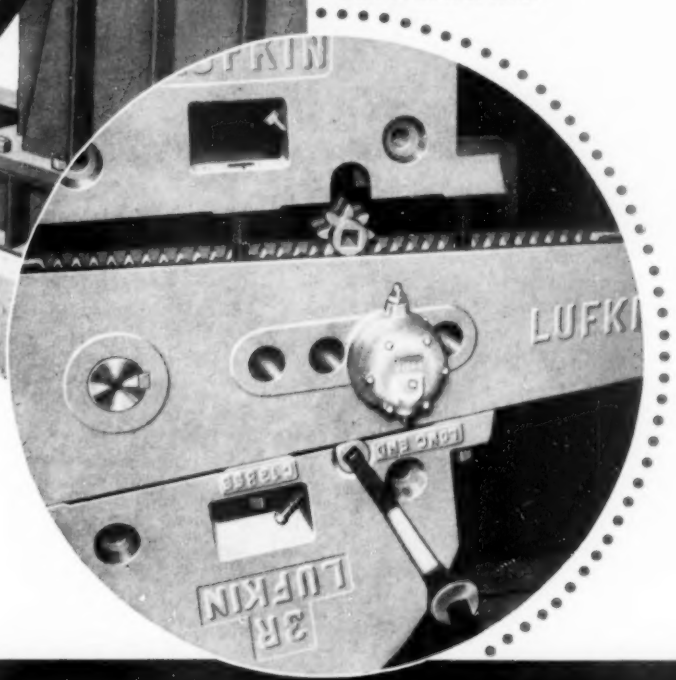
THE LUFKIN TROUT CRANK IS THE *ORIGINAL* ADJUSTABLE COUNTERBALANCED CRANK! NO LOOSE WEIGHTS TO ADD OR REMOVE

NOW BUILT WITH RACK AND PINION FOR GREATER EASE AND CONVENIENCE IN MOVING THE COUNTERWEIGHTS.

ALL FOUR COUNTERWEIGHTS CAN BE ADJUSTED WITHOUT REPOSITIONING CRANKS.

THE SAME RUGGED SIMPLICITY WITH ADDED SAFETY AND CONVENIENCE.





A ONE MAN CREW IS ALL THAT'S NECESSARY

Lufkin **FOUNDRY & MACHINE COMPANY**

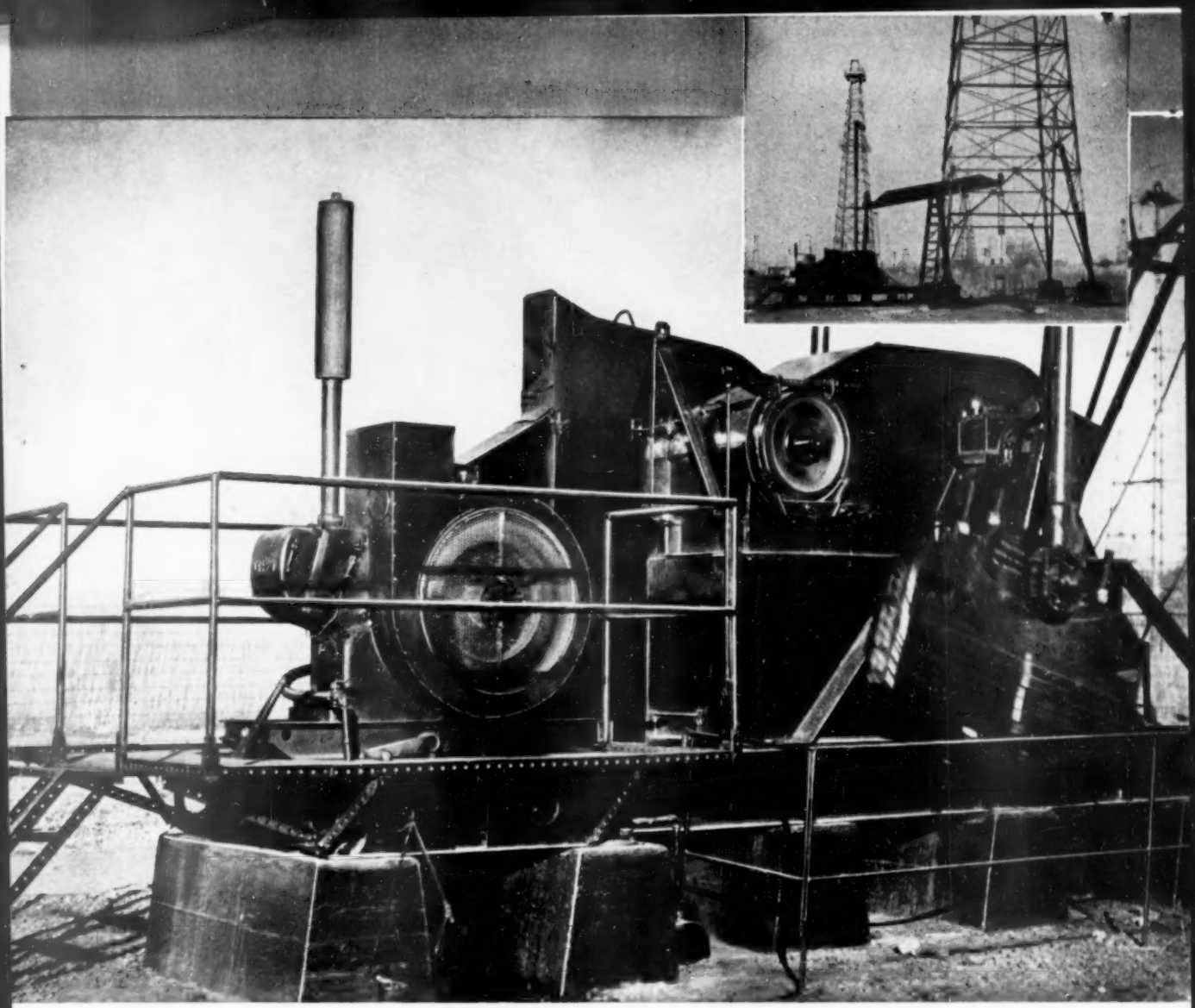
LUFKIN, TEXAS

Branch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming, Great Bend, Kansas, Effingham, Illinois, Duncan, Oklahoma, Brookhaven, Mississippi

Lufkin Equipment in CANADA is handled by

THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, Edmonton, Alberta, Canada.

LeRoi A288's
do it again!...
...prove that they
pump oil
– longer
– at less cost
– with less maintenance
than any other
well-pumping engines!
See for yourself



Cost per HP-hour only half

of what major oil company considers good for engines on well-pumping service

Installation No. 1

Le Roi A288 pumped 50 barrels water, 70 barrels oil from 6,475 feet with an estimated load of 11-12 HP.

A288 operated for 1078 24-hour days — without being overhauled!

Operating cost per day — including pumpers' wages, fuel, and maintenance — only 90 cents!

Installation No. 2

Le Roi A288 pumped 180 barrels water, 10 barrels oil from about 6,475 feet with a load of 18 HP.

A288 operated for 911 24-hour days. Maintenance cost was only $.0017/HP-hr.

Operating cost per day — including pumpers' wages, fuel, and maintenance — only 69 cents!

That's real dependability! And economy! It's the kind of profitable performance Le Roi A288 owners in every producing area get every day.

And it's performance *you*, too, can have. See your supply house or Le Roi distributor — ask them to show you A288 installations. And have them tell you the reasons why the A288 is the only engine to be recommended by one major pumping-engine user for continuous service unattended for up to two weeks at a time!

LE ROI

LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

Plants: **Milwaukee • Cleveland • Greenwich, Ohio**

Oil Field Headquarters: **Tulsa, Oklahoma**

Service as Near as Your Telephone

Complete parts stocks
Skilled mechanics on 24-hour call
Unexcelled overhaul facilities

Oilfield Sales-Service Network

Oklahoma
Le Roi Company Branch—Tulsa.
Carson Machine & Supply Co.—Oklahoma City.

East & South Texas, Gulf Coast
Southern Engine and Pump Company—Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, New Orleans, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co.—Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine & Supply Co.—Great Bend.

Michigan
Hafer Engine Service—Reed City.

Rocky Mountain Area
Gehring Equipment Co.—
Casper, Wyoming, Rangely, Col.

Mississippi, Arkansas and Northern Louisiana
Ingersoll Corporation—Shreveport, Louisiana, El Dorado, Arkansas and Clarksdale, Jackson, Mississippi.

West Coast
Le Roi Engine Sales Co.—
Long Beach, California.

Appalachian Area
P. C. McKenzie Co.—Pittsburgh, Bradford.

Canada
Lucey Export Ltd.—Calgary, Edmonton, Alberta.

F-120

These little things

...make a *Big Difference!*

BE SURE YOU ALWAYS GET GENUINE O·C·T FLOW BEANS

Most flow beans look a lot alike at a glance. The difference is more than "skin deep." O-C-T Flow Beans, for example, are made of special analysis steel. Threads are accurately machined to API specifications. Orifices are precision drilled to assure uniformity in flow. O-C-T Flow Beans are held strictly to proration test specifications. The only way you can be sure that you get this uniformly high O-C-T quality is to always look for the O-C-T trademark when you buy. It is clearly stamped on the bean body. Specify O-C-T to your supply store. They are available through more than 700 supply store locations.

7 OUT OF 10 OPERATORS SELECT O-C-T FITTINGS

Oil Center Tool Co. P. O. Box 3091 Houston, Texas

Export Representatives Sterling Areas - Le Grand Sutcliff & Gell Ltd. Rochester, Kent, England Address Export Inquiries for All Other Countries to P. O. Box 3091 Houston 1, Texas

Here's proof...

G-E 2-WAY WILL PERFORM IN ANY CIVIL DISASTER!

● Civil defense authorities throughout the nation agree that successful programs must include dependable radio communication. The system has to function before, during and after an emergency. Well, G-E Mobile Radio does exactly that . . . and it can be proved!

Note the experience encountered by Tennessee's State Highway Patrol. The car pictured above was caught in a cyclone near Dyersburg . . . turned up on end . . . spun around several times . . . then hurled 1200 feet. An examination of its General Electric mobile transmitter after the disaster showed *just one tube broken and still capable of operation.*

Make this superior communications equipment *your* first line of defense. Buy only General Electric!

You can put your confidence in—

GENERAL ELECTRIC

2-WAY MOBILE RADIO

General Electric Company, Section X834-15
Electronics Park, Syracuse, New York

Please have a Communications Counselor call at my office.

NAME .....

ADDRESS .....

CITY ..... STATE .....

"on a big bender"

The section of steel pipe shown above is on "a big bender"... the machine illustrated is putting a custom-made bend in the pipe to fit a curved section of the trench. It saves a lot of work and expense by taking care of tough angles right on the job.

This section of pipe, like every other part of this pipeline, will be treated with a Barrett Coal-Tar Protective Coating to provide long-lasting protection. Barrett high-quality protective coatings cover all the angles of pipeline construction, too — rough terrain, tough handling, and nasty weather conditions. It's an interesting fact that these top-quality protective coatings while they lengthen the life of steel pipeline indefinitely, increase the cost by only the smallest fraction. And when you specify Barrett you are getting the finest protective coatings plus expert technical assistance.

The Barrett Technical Service Group assists you right from the blueprint stage. They help you select the coating for your pipeline which provides top protection at minimum cost. In the field, Barrett Service Representatives are always ready for on the spot check-ups, advice and assistance with the preparation of pipe and application of coating. We welcome the opportunity to place the Barrett Technical Service Group at *your* service. For detailed information — phone, write, or wire Barrett.

Approved Barrett Applicators are available for field or special work throughout the country.

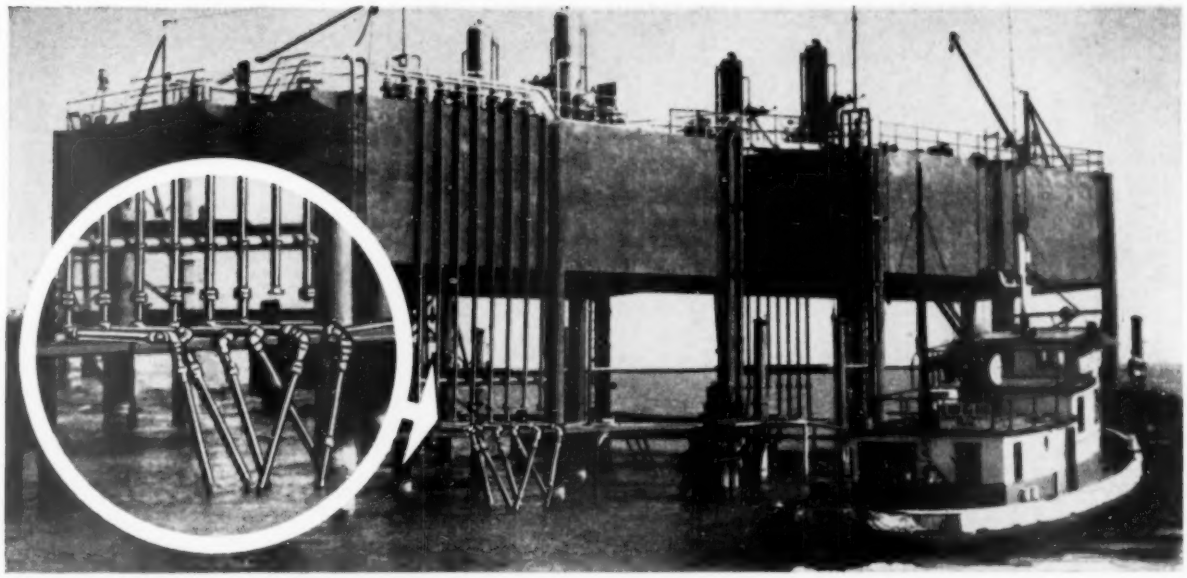
BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector St., N. Y. 6, N. Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal.

Allied Chemical

100 Years of Experience

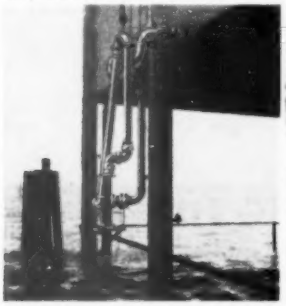
1854 1954 CENTENNIAL Barrett 100 YEARS OF EXPERIENCE

BARRETT PROTECTIVE COATINGS



Chiksan swivel joints are used on the 12 underwater lines on this portable submersible tank battery barge which stores oil from 12 wells. Three swivel joints are used on each line to provide necessary flexibility and safety against storms, wind and waves. Visible in this photograph are style 50 Chiksan joints. Style 10 and style 50 joints are below the surface.

Davey Jones' Locker



Each submersible tank battery has a 6" or 8" CHIKSAN aluminum Marine and Barge Loading Hose that permits unloading of oil to the barges.

IS FULL OF *CHIKSAN* MARINE SWIVEL JOINTS . . . 3 Years of Storms, Wind and Waves Have Proved the Flexibility, Economy and Safety of CHIKSAN Marine Swivel Joints in Submerged Salt Water Service.

In the bays along the Texas and Louisiana Gulf Coast submersible tank-battery barge storage and transfer of oil has been made both possible and practicable with the application of CHIKSAN Marine Swivel Joints to the under-water flow lines.

In waters that range from 8 to 35 feet deep and with pressures up to 2100 psi. CHIKSAN joints have given the necessary flexibility of flow lines, economy of transport and safety of operation in transferring oil for distances in excess of 13 miles under water without line rupture or loss of product. Tight bends and connections on the flow lines between well platforms, tank batteries, metering platforms or drilling structures in the operation of off-shore locations that could not withstand the "Sunday Punch" of wind, waves and dragging boat anchors, are eliminated by the use of CHIKSAN swivel joints.

CHIKSAN'S special design submersible Marine Swivel Joints have once again solved a costly and perplexing problem of the Petroleum Industry.

Write CHIKSAN Engineering and Research for complete details. Dept. 3-OGJ

After 3 years of under-water service this CHIKSAN Marine Swivel Joint has been raised from 14 feet of water 13 miles from shore to service the packing.

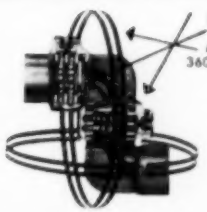
Same CHIKSAN joint being cleaned of marine growth after re-packing and preparatory to re-submerging for years more of safe and economical service.

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

THE NEW TOOL OF MODERN INDUSTRY



CHIKSAN Ball Bearing Swivel Joints are THE NEW TOOL of Modern Industry with full 360° rotation in 1, 2, and 3 planes. Over 1,000 different types, styles, and sizes have been developed for pressures and services from 28" vacuum to 15,000 psi and for temperature ranges from minus 70° to a plus 500° F. with packing materials for each specific service.

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 3, Illinois • Newark 2, New Jersey

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Co., Brea, Calif.; Newark 2, N. J. • Chiksan of Canada Ltd., Edmonton, Alta.

INSTALL STAYNEW HYDRAULIC AND BREATHER FILTERS

As Original Equipment on Your Hydraulic Machinery

Fit the filtering requirements of your hydraulic machinery to your specific needs by installing Staynew Hydraulic and Breather Filters.

Staynew HE Hydraulic Filter

Staynew BR Breather Filter

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

HYDRAULIC FILTERS

Compact, simplified filters for use wherever dirty liquids are collected, filtered or recirculated. Wide range of metallic mesh and fabric media are available. Long operation assured without cleaning or replacement.

BREATHER FILTERS

Permit practically constant interior pressure by allowing atmospheric air to be drawn in or exhausted as required—while preventing entrance of impurities and escape of liquid mist or fog.

When you build this perfect combination into your hydraulic machinery, you'll save costly equipment wear, spoilage, and maintenance time.

Let our Engineering Department solve your hydraulic filtration problems. Write today for Bulletin HF-2.

Representatives in Principal Cities

DOLLINGER CORPORATION, 5 Centre Pk., Rochester 3,.N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

FIVE YEARS FIRST!

THERE'S NO SUBSTITUTE FOR HALLIBURTON EXPERIENCE IN

FRACTURING SERVICES

SANDOIL · HYDRAFRAC · ACIDFRAC

35,000 jobs is a lot of experience in the fairly new science of formation fracturing. Yet Halliburton has been employed in performing that many jobs – and more – during the five years it has pioneered this service. *This hard-earned practical experience makes Halliburton first choice of operators everywhere.*

Production results with Fracturing Service by Halliburton have been truly outstanding during this five year period. Three out of every four wells treated have responded successfully. These wells, in widely-separated areas, yielded *additional* oil recovery averaging 175%.

Hydraulic Fracturing works like this: Permeability blocks are broken when a viscous gel or oil, forced downhole under tremendous pressure, splits the formation at the desired point. Graded sand, forced into the crevice, remains to prop open the pay zone channels.

Fracturing Service with Halliburton has proved valuable in reviving seemingly worn-out wells. Now, it is finding increased acceptance as a most effective completion process for new wells.

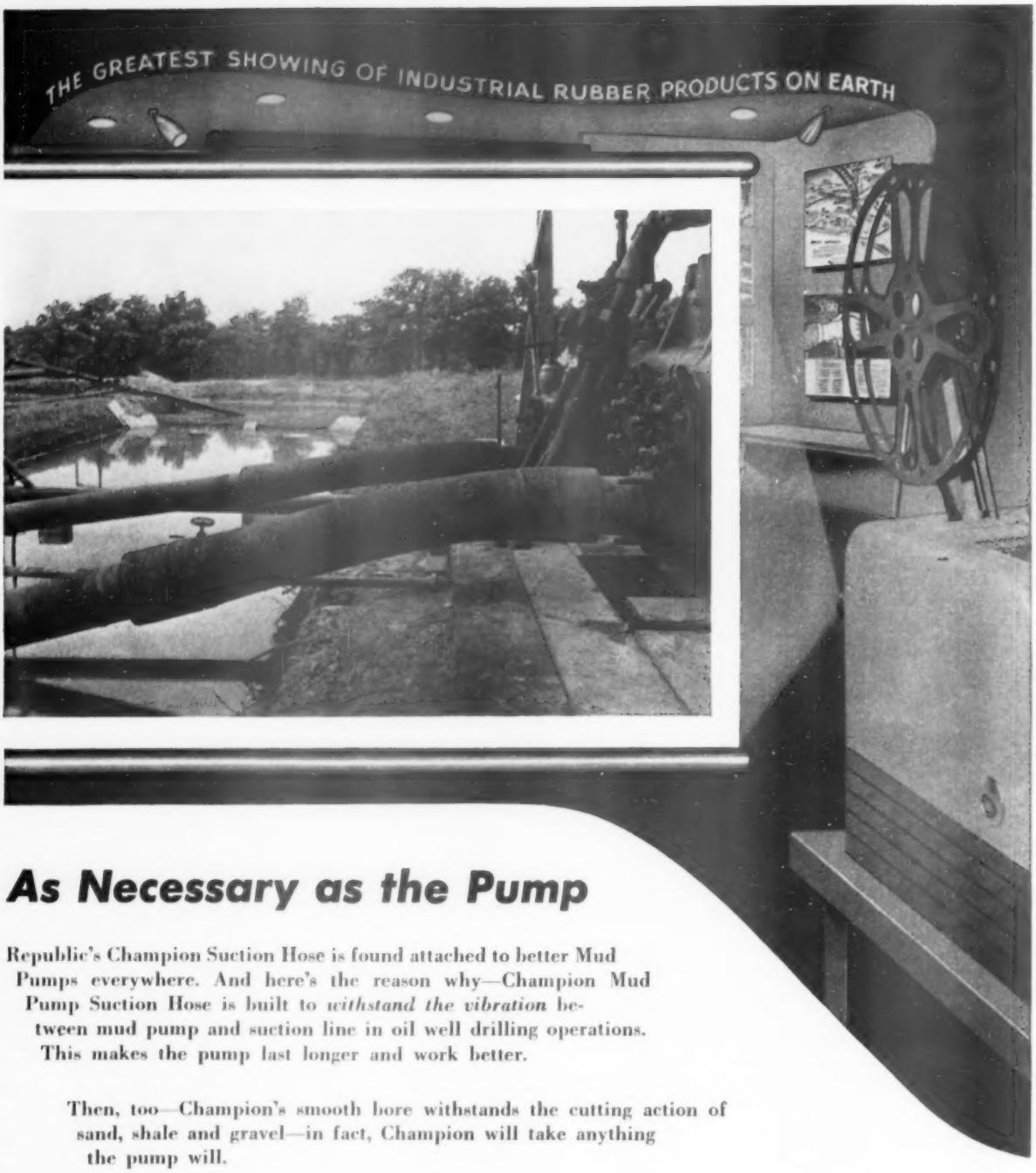
Success of Fracturing treatments depends also on correct interpretation of well data. Halliburton Fracturing technicians – five year leaders in the field – base their recommendation on experienced evaluation of all such data. *There is no substitute for the combined weight of 35,000 Fracturing jobs.* So, take advantage of this experienced know-how to get the best in Fracturing Service on your next job. Phone your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

FRACTURING SERVICES

Hydrafrac – Reg. U. S. Pat. Off.

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES!



As Necessary as the Pump

Republic's Champion Suction Hose is found attached to better Mud Pumps everywhere. And here's the reason why—Champion Mud Pump Suction Hose is built to *withstand the vibration* between mud pump and suction line in oil well drilling operations. This makes the pump last longer and work better.

Then, too—Champion's smooth bore withstands the cutting action of sand, shale and gravel—in fact, Champion will take anything the pump will.

So—to keep your mud pump operating at top efficiency—ask your Republic Distributor about Champion Mud Pump Suction Hose as well as the other oil field workers that Republic makes for you.

"Quality Hose Builders for Over 50 Years"

MID-CONTINENT DISTRIBUTOR
Jones & Laughlin Steel Corporation, Supply Division
P. O. Drawer 2481, Tulsa 2, Okla.

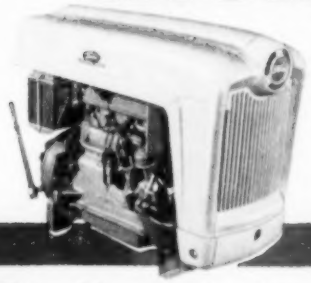
REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO
INDUSTRIAL RUBBER PRODUCTS

WEST COAST DISTRIBUTORS
Henrie Belting & Rubber Co.
405 Towne Ave., Los Angeles, Calif.
Pacific Coast Rubber Company
51 Main St., San Francisco, Calif.

Here's Big News!

FORD'S LATEST "172" CU. IN. ENGINE

★ OVERHEAD-VALVE
★ LARGE BORE
★ SHORT-STROKE
★ DEEP RIGID BLOCK



Pictured here are two types of sheet metal available with this Ford "172" 4-Cyl. Power Unit. Either type can also be specified with the Ford "134" 4-Cyl. Power Unit.

Ford
INDUSTRIAL ENGINES AND POWER UNITS

Here is another Ford power plant of the most modern large bore, short-stroke, low-friction design . . . engineered, built and tested *exclusively* for *industrial* applications!

This new Ford engine delivers the mightiest concentration of power *per cubic inch* of any engine of comparable size and weight. With only 172 cu. in. displacement, this 4-cylinder engine attains a maximum of 58 brake horsepower at 2400 rpm. Less displacement normally requires less gas which means greater daily operating economy. Other outstanding features of this new Ford "172" Heavy Duty Industrial Engine are listed below.

Glance through them now and don't hesitate to ask or write for a detailed folder with complete specifications or any other information on the latest in engine design. *Write to:*

INDUSTRIAL ENGINE DEPARTMENT
FORD MOTOR COMPANY
15050 Woodward Avenue, Highland Park 3, Michigan

Features that Provide Highest Performance and Outstanding Economy

Large bore (3.90 in.) combined with *short stroke* (3.60) cuts piston travel, reduces friction, delivers more power at clutch and reduces fuel costs.

Deep-skirted crankcase is a feature that provides high structural rigidity for more efficient operation and longer life.

Precision-molded alloy iron crankshaft, fully counter-balanced in motion with mirror-like bearing surfaces that reduce friction to a minimum.

Free-turn valves (intake and exhaust) for even wear to help maintain high compression for longer than average period and reduce the possibility of valve sticking.

Weather-proofed ignition provides molded rubber integral seals for all spark plug terminals and lead wires. Distributor also tightly sealed against dust and dampness.

Full-flow oil filter with full-pressure lubrication contributes to longer engine life.

Autothermic pistons of cam-ground aluminum alloy with steel struts for controlled piston-to-sleeve clearance.

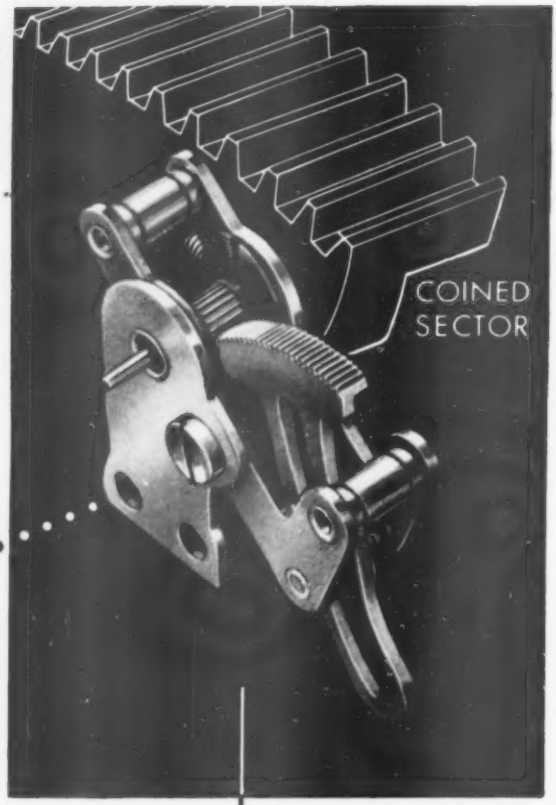
Full-length water jackets surrounding each cylinder to maintain uniform temperature, which in turn minimizes bore distortion and reduces wear.

Fast-acting, fully lubricated, variable speed governor is mounted on crankshaft as an integral part of engine.

Every Ford Industrial Engine from 134 cu. in. to 317 cu. in. is a complete, precision-built "Power Package," delivered fully equipped, tested and ready-to-run. All are available as Engine Assemblies or Complete Power Units with a wide variety of accessories and adaptations to fit your job.

...for the world's finest gauge:

. . . the world's finest movement



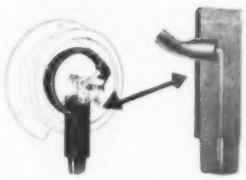
To actually become the standard of comparison in its field, a product must be better; not just in some ways, but in *all* ways.

A particularly good example of such a product is the Marsh Master-gauge. By giving industry a gauge that is better in *all* ways, it has become the recognized standard of comparison in the pressure gauge field.

The movement illustrated here represents just one way—but a very important way—in which the Mastergauge excels. In a pressure gauge, the movement has the vital assignment of converting the action of the bourdon tube into accurate pressure indication. To do this unfailingly, a movement must be ruggedly constructed, practically frictionless and highly resistant to corrosion.

All of these attributes are ideally combined in the Master gauge movement. A self-lubricating, frictionless effect is achieved by using alternate stainless steel and monel throughout . . . gears, hardened stainless; bushings, "K" monel, and so on through all moving parts. A particularly outstanding feature contributing lasting accuracy is the "coined" sector gear. Note the broad face which results from this coined extrusion of the gear blank.

Yes, features like these, along with precision machining, painstaking assembly, and thoroughgoing testing, makes a better-in-all-ways movement for a better-in-all-ways gauge. Ask for up-to-the-minute information.



A better tube construction . . .

"Connoweld" A truly revolutionary development is the joining of the socket, bourdon tube, and end-piece into a one-piece unit in the Marsh Mastergauge. The photo of a socket cut in half shows the perfect fusion at the point where too many gauges leak. A special Marsh process — the Connoweld Process — makes this possible.

A better Case . . .

"Marshalloy" Another recent development that has increased Mastergauge leadership is the copper-clad, wrought steel case. Copper surfaced by the Marsh-developed "Marshalloy" process, the case is attractive and non-corrosive. It is four times as strong and one-third lighter than conventional cast iron case!

MARSH INSTRUMENT CO., *Sales affiliate of Jas. P. Marsh Corporation*
Dept. L, Skokie, Illinois
Export Dept., 3501 Howard St., Skokie, Ill.

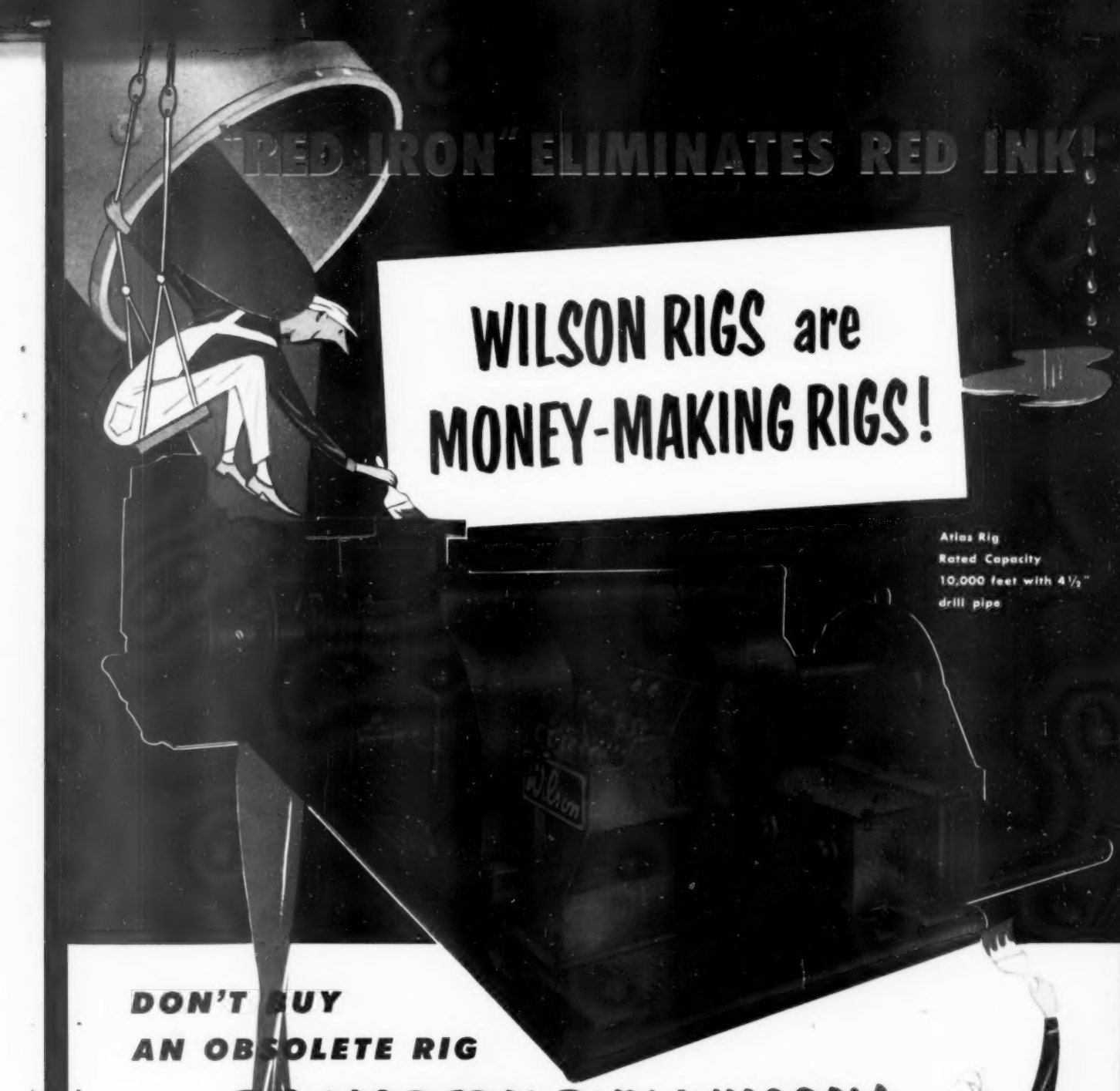
MARSH GAUGES

"THE STANDARD OF ACCURACY"

Thermometers • Water Regulating Valves • Solenoid Valves • Heating Specialties

"RED IRON" ELIMINATES RED INK!

WILSON RIGS are MONEY-MAKING RIGS!



Atlas Rig
Rated Capacity
10,000 feet with 4½"
drill pipe

DON'T BUY AN OBSOLETE RIG

BE MODERN-BUY WILSON!

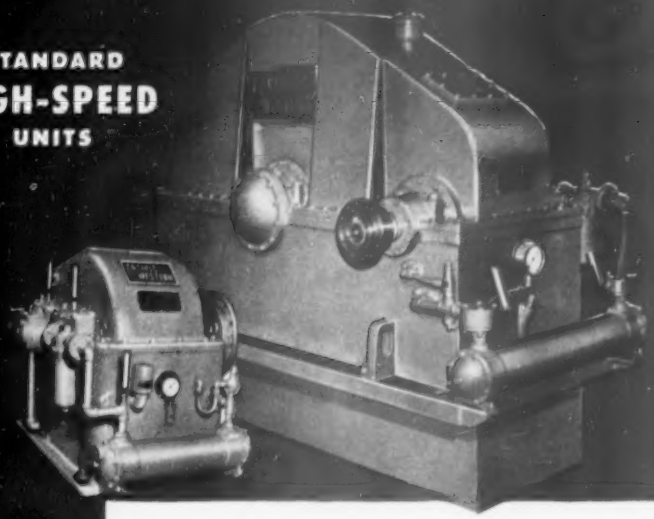
First choice with Drilling Contractors . . . Best Friend of the Auditors. Wilson — the FIRST NAME in DRILLING RIGS! The only compound rigs with EIGHT SPEED, ALL-FRICTION DRIVES. Wilson . . . the Power Rig Pioneer . . . is still years ahead of the field.

The FIRST NAME in DRILLING RIGS!

WILSON MANUFACTURING CO., Inc.

The HOME of RED Iron • WICHITA FALLS, TEXAS, U.S.A.

STANDARD
HIGH-SPEED
UNITS



SPECIAL
HIGH-SPEED
UNITS

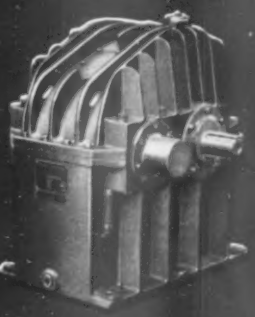
GEAR DRIVES

for every type of pumping service

Complete service to the Petroleum Industry by Western Gear Works includes the design, production, testing and application of all types of gear drives.

WESTERN GEAR

"Good Gears Since 1888"



STANDARD
SPEED-REDUCERS

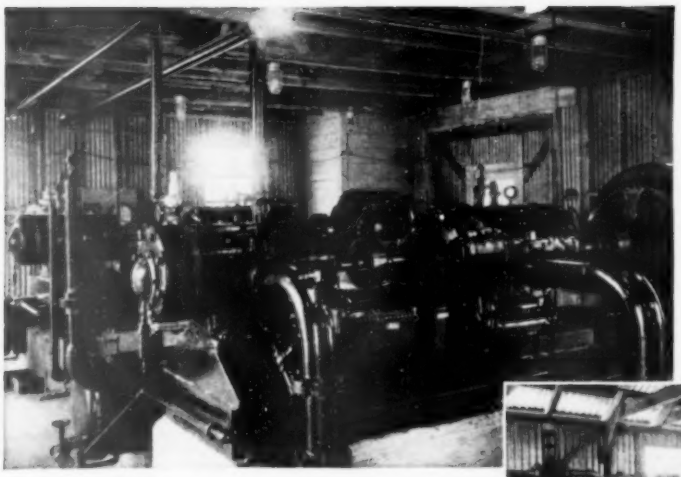
Write on your letterhead for Bulletin 5204 **"Gear Drives for Pipeline Service"**

WESTERN GEAR WORKS

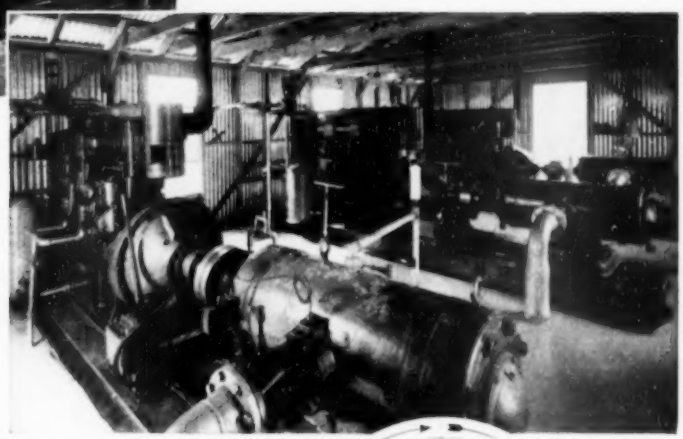
Manufacturers of **PACIFIC-WESTERN** Gear Products

Pacific Gear & Tool Works

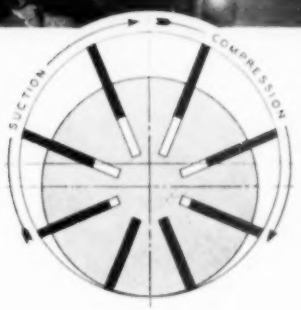
Plants: Seattle
San Francisco
Belmont
(S. F. Peninsula)
Lynwood
(Los Angeles County)
Pasadena
Houston



Two Fuller rotary two-stage gas boosters, each handling 1,500,000 SCFD, with atmospheric inlet pressure, or 2,500,000 SCFD, 10 psig. inlet pressure can be handled compressing to 70 psig. discharge, electric motor drive.



Three Fuller rotary single-stage natural gas boosters, capacity each 1,430,000 cu. ft./24 hrs. from 5-lb. to 25-lb. gage, driven by Climax gas engine.



BOOSTING GAS?
with FULLER rotary compressors
IT NEED NOT BE COSTLY

Fuller Rotary Compressors for booster service have many advantages that warrant your closest examination, whether for field boosting or to trunk-line levels. You'll find these units do a better job . . . better because they reduce maintenance cost, cut inspection time, last longer, do the job efficiently.

They're sturdy, dependable, because they have a minimum of moving parts—rotor, bearings, blades—requiring minimum attention. No valves to leak, no seats to grind; blades automatically compensate for wear, *maintaining capacities for the life of the machines.*

No detail has been overlooked that will make for long-term, trouble-free service, at the lowest maintenance and operating cost. These features explain why Fuller boosters do an outstanding job wherever gas is handled. For detailed information on Fuller Rotary Compressors, that will do a better job for you, write for Bulletin C-5A.

FULLER COMPANY—CATASAUQUA, PA.

Branch offices

Chicago—San Francisco—Los Angeles—Seattle—Birmingham

Fuller

PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

C-238
2155

TEFLON GASKETS

make a difference in performance!

By equipping every a.c.f. Lubricated Plug Valve with the new Teflon Gasket, we have lengthened service life while improving operation.

You get greater protection against head leakage... trouble-free operation in temperatures up to 450° F. Greatly reduced turning torque.

What's more, this new gasket—tested in the field for four years under the most exacting conditions—is a discovery that can mean substantial savings in time and money. Investigate today! See your a.c.f. Representative for the complete facts.

Gasket characteristics:

- self lubricating
- can't bind
- unique shape maintains lubricant release
- pressure tight

Round Port Valves—100% Obstruction Free • Rectangular Port Valves with Full Pipe Area • Venturi Valves for Economy

a.c.f. CYLINDRICAL FULL PIPE AREA **PLUG VALVES**

Representatives in 50 Principal Cities

Write for Catalog No. 4-OG and Price List. American Car and Foundry Company, Valve Division, 1501 E. Ferry Avenue, Detroit 11, Michigan

Catch fish with wire rope?

WICKWIRE ROPE
A CF&I PRODUCT

Yes, gentlemen, there's more fish caught with wire rope than ever nibbled at a baited hook. Satisfying America's appetite for nutritious seafood is a stupendous job, calling for fleets of fast, powerful trawlers that net their catches in prodigious quantities. To hold and haul in the heavily laden nets, the fishing industry annually uses millions of feet of wire rope.

There's a good chance the fish you eat comes to your table with the help of Wickwire Rope. Because, for over half a century, Wickwire Rope has "grown up" with the nation's fisheries. As in so many other activities where wire rope is used, the men who man the fishing fleets have a high regard for its strength and durability under the toughest conditions.

A YELLOW TRIANGLE ON THE REEL IDENTIFIES WICKWIRE ROPE

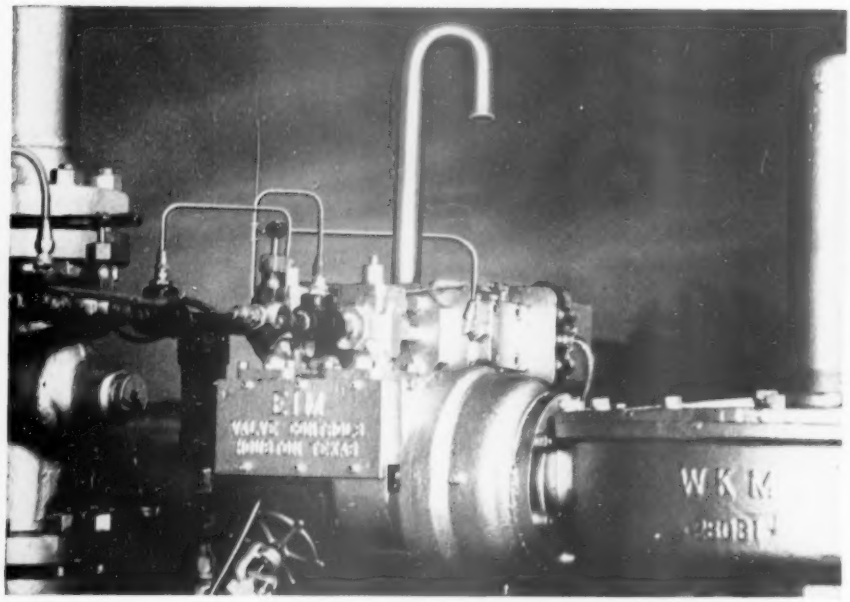
THE COLORADO FUEL AND IRON CORPORATION—Abilene (Tex.) • Denver
Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION—Los Angeles • Oakland
Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga
Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia

WICKWIRE ROPE
CF&I PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

1757

PROGRESSIVE GAS PIPE LINERS SPECIFY . . .

E-I-M PIPE LINE VALVE CONTROLS



The G2 takes its source of power from the medium in the transmission line, without any pressure reduction. There are no small parts. It's a compact unit with all piping, valving and controls integrally arranged. Field piping is kept to a minimum. Actually, only one small line from the pressure source to the valve control is required.

Some 180 Type G-2 valve controls are employed in Texas Eastern Transmission Company's stations and along the line.

E-I-M VALVE CONTROLS ARE HELPING TO PROTECT MOST OF THE MAJOR PIPE LINES. IF YOU HAVE A PIPE LINE CONTROL PROBLEM, CHECK FIRST WITH E-I-M. THERE IS A WHOLE FAMILY OF E-I-M STANDARD CONTROL DEVICES, AROUND WHICH ENGINEERS MAY DESIGN THEIR OWN CUSTOM-BUILT VALVE CONTROL SCHEMES. E-I-M VALVE CONTROLS ARE DESIGNED TO OPERATE GATE, GLOBE, PLUG AND BUTTERFLY VALVES, AND THEY MAY BE ADAPTED FOR OTHER PURPOSES. THEY MAY BE OPERATED ELECTRICALLY, PNEUMATICALLY AND HYDRAULICALLY. INSTRUMENTATION MAY BE FULLY AUTOMATIC, UTILIZING VHF RADIO OR OTHER MEDIA.

E-I-M valve controls offer flexibility of installation and operation.
Remember: They may be installed on your present valves in the field.

Write for our descriptive folders.

E-I-M Company INCORPORATED

1340 OLD SPANISH TRAIL • HOUSTON 25, TEXAS • MOhawk 4587
Valve Controls • Speed Reducers • Cooling Tower Drives • Control Valves

Charles A. Dana

What do you know about Dana?

The Dana Corporation comprises a group of industries that is widely diversified in lines of manufacture. Its principal service is to those companies producing passenger cars, trucks, buses and tractors, and other self-propelled vehicles, for civilian and military use. Many Dana products are used in the aircraft industry, and as components in a wide range of machinery and appliances.

The Dana Corporation had its founding in the Spicer Corporation in 1904. This company was formed by Clarence W. Spicer, inventor of the first commercially-produced automotive universal joint. Spicer Joints now are used as standard equipment on a majority of the world's automotive vehicles. Today the Dana Corporation produces in its 10 modern domestic plants, and associated plants in Canada, Great Britain and France, the following products: transmissions, universal joints, propeller shafts, Brown-Lipe and Auburn clutches, forgings, axles, stampings, Spicer Brown-Lipe gear boxes, Parish frames, torque converters, power take-offs, power take-off joints, rail car drives, railway generator drives, aircraft gears, and welded tubing.

SPICER MANUFACTURING DIVISION

of Dana Corporation • Toledo 1, Ohio

TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • BROWN-LIPE and AUBURN CLUTCHES • FORGINGS • AXLES • STAMPINGS • SPICER BROWN-LIPE GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES RAILWAY GENERATOR DRIVES • AIRCRAFT GEARS • WELDED TUBING

50 YEARS OF Spicer SERVICE

ENGINEERING DANA MANUFACTURING

Thomas Curran, Partner, with one of the three Wheland HP-14000 pumps owned by Curran-Kiel Drilling Company, Wichita Falls, Texas. Mr. Curran reports:

"We believe they are the

MOST ECONOMICAL PUMPS

ON THE MARKET"

WHELAND

HP-14000 7½" x 14"

DUPLEX SLUSH PUMP

350 Horsepower

Nominal input at 60 RPM
Discharge pressure with 7½" liners 838 PSI
Discharge pressure with 5½" liners 1627 PSI

Driller after driller reports Wheland HP-14000 pumps have helped drastically reduce drilling time and bit costs—sometimes as much as 50%! The high speeds and pressures maintained really deliver the mud, enable you to get the job done fast when the chips are down. The HP-14000 is designed and built for fast, steady operation day after day. Repair costs and down time are cut to a minimum.

Prove it to yourself—visit a Wheland HP-14000 pump on the job and talk to the men who run it. We'll be glad to send you the name of a nearby HP-14000 installation on request.

THE PUMP FOR JET DRILLING

Wheland HP-14000 delivers the most pressure per pound of pump, and provides the best balance of pressure and volume for jet drilling. Data sheets from actual jet drilling performance on request.

WRITE FOR DETAILED BULLETIN

WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.
ROTARY DRILLING MACHINERY

TRADE WHELAND MARK

DRAWWORKS • SLUSH PUMPS
ROTARIES • CROWN BLOCKS
TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS & THEIR HEADQUARTERS: Jones & Laughlin Steel Corp., Supply Division, Tulsa, Okla. • Houston Oil Field Material Co., Inc., Houston, Texas • Iverson Supply Co., Tulsa, Okla. • Lucey Products Corp., Tulsa, Okla. • Superior Iron Works & Supply Co., Inc., Shreveport La. • Industrial Supply Co., Wichita Falls, Texas

EXPORT DISTRIBUTOR: Lucey Export Corporation, 233 Broadway, New York 7, New York—Broad Street House, London, E. C. 2, England

YOU CAN *Specify* MINIMUM MAINTENANCE COSTS WITH *Amercoat* PROTECTIVE COATINGS

ONLY AMERCOAT PROVIDES YOU WITH

The most complete line of corrosion resistant coatings available anywhere

Field service backed by an organization SPECIALIZING in corrosion control

The service life of your equipment—the efficiency of your production schedules — the ultimate value of your investment and maintenance dollars — all are vitally dependent on the continuing performance of the protective coatings specified in your plant. Thus, success or failure of your coatings can mean the difference between tremendous losses or substantial savings.

To assure coating performance that provides long-lasting, low-cost protection, two steps are absolute essentials, right from the start. You need the right coating for each specific exposure, and it must be applied properly if it is to yield maximum benefit.

AMERCOAT ELIMINATES THE GUESSWORK—MINIMIZES MAINTENANCE COSTS

First of all, AMERCOAT provides the right coating for the particular problem. From the complete AMERCOAT line, it is possible to provide specific coatings for specific exposures to achieve specified protective performance.

In addition, you receive the added value of AMERCOAT's conscientious service follow-through backed by an organization SPECIALIZING in industrial corrosion control. With the assistance and on-the-spot advice of a trained representative, you get the best possible application through proper attention to surface preparation and correct coating techniques.

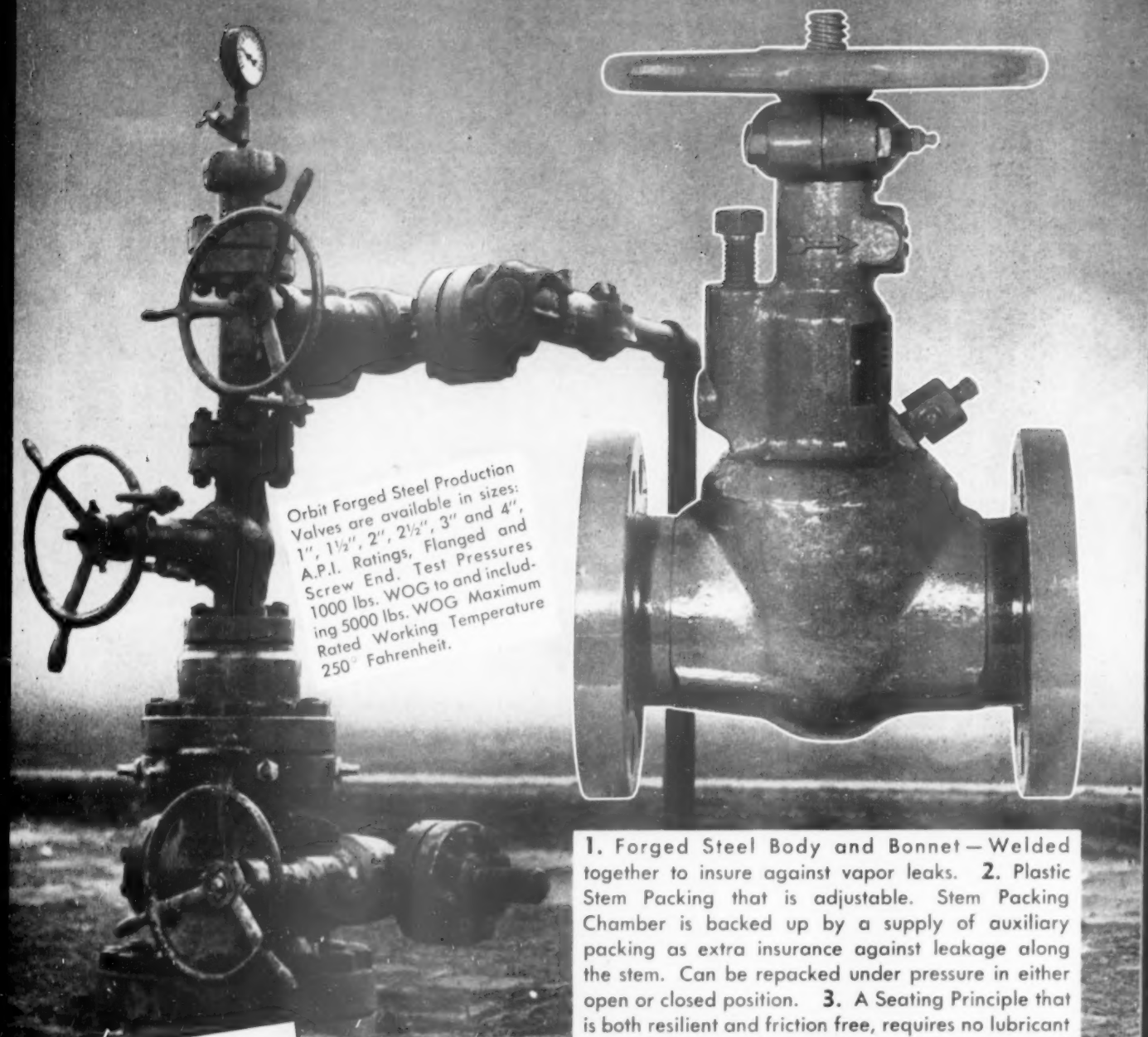
Investigate AMERCOAT now. It's your surest way to effective, long-term corrosion control. An experienced representative is near you to serve you. For complete details write today.

Amercoat CORPORATION
4809 Firestone Blvd., South Gate, Calif.

CHICAGO, ILLINOIS
KENILWORTH, NEW JERSEY
JACKSONVILLE, FLORIDA
HOUSTON, TEXAS

ORBIT VALVES®

Specified for High and Low Pressure Production



Orbit Forged Steel Production Valves are available in sizes: 1", 1½", 2", 2½", 3" and 4", A.P.I. Ratings, Flanged and Screw End. Test Pressures 1000 lbs. WOG to and including 5000 lbs. WOG Maximum Rated Working Temperature 250° Fahrenheit.

1. Forged Steel Body and Bonnet — Welded together to insure against vapor leaks. **2.** Plastic Stem Packing that is adjustable. Stem Packing Chamber is backed up by a supply of auxiliary packing as extra insurance against leakage along the stem. Can be repacked under pressure in either open or closed position. **3.** A Seating Principle that is both resilient and friction free, requires no lubricant to effect a seal. **4.** Rising Stem. Operator can tell at a glance whether valve is in open or closed position — guessing can be costly.

BRANCHES

HOUSTON, TEXAS
407 Velasco
(Serving the Gulf Coast)

ODESSA, TEXAS
402 West County Road
(Serving West Texas)

CASPER, WYOMING
1740 E. Yellowstone
(Serving the Rocky Mountain States and Canada)

There is only one ORBIT

ORBIT VALVE COMPANY

BOX 699 TULSA, OKLAHOMA

They Say—

Good News to West

"This prospective solution to Iran's oil problem is good news to the West. Iran needs the proceeds to rehabilitate its economy and reattainment of anything like the prosperous condition the country enjoyed before Mossadegh threw a wrench into the machinery is certain to move the nation further from the danger of Communist penetration and into closer alliance with the community of free nations.

"We hope nothing interferes with early conclusion of the oil settlement. Iran needs the money—the West needs this cold war victory."

Editorial in the Oil City (Pa.) Derrick.

Plug for Repressuring

"The repressuring method illustrates not only the capacity of the oil industry to do big things in a big way, but it shows the scientific trend of the industry and the ingenuity of the operators.

"Apparently, a field pretty well pumped out can be made to yield as much as it ever did or in the flush era right after intensive drilling.

"Nobody knows how big the hidden pools far down may be or how long it will take the water to chase all the oil to the top, but all of us, no matter how ignorant of oil processes, realize a way of bolstering an apparently failing resource has been developed."

Editorial in the Tulsa World.

Refinery Stocks Must Be Cut

"Gasoline price cutting is common in many parts of the country today and is bound to spread if distress stocks increase. In some places gasoline prices are down to last year's level although refiners are paying 25 cents per barrel more for crude. It appears that technological improvement has run ahead of business horse sense.

"If only refiners suffered from price cuts, the attitude might be that it 'serves 'em right.' But if this reflects back in a cut in crude prices it will slow down discovery and development of new reserves. The producing division of the industry has fairly well tailored its output to current demand and is reconciled to carrying some idle excess capacity. The refining division must do the same.

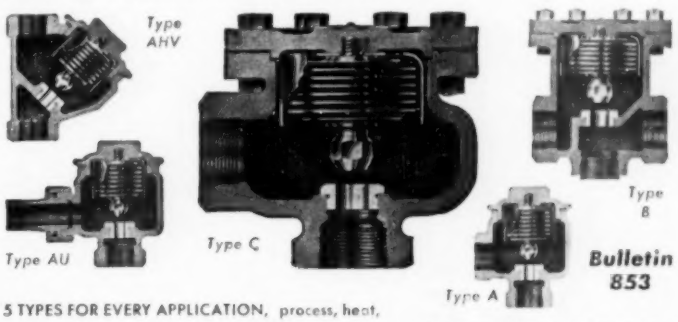
"Many other industries are currently undergoing inventory readjustments.

In This Plant Nicholson Traps

SAVED 10% IN STEAM COSTS

Chief Engineer H.F.D. stated, after Nicholsons replaced mechanical traps in his plant: "Saving in steam waste cut our fuel cost at least 10%. Yet application temperatures were up 30°-40°. And relief of all air binding effected faster warm up."

Operate on lowest temperature differential; 2 to 6 times average drainage capacity; maximum air venting. For other advanced Nicholson features send for Bulletin 853.



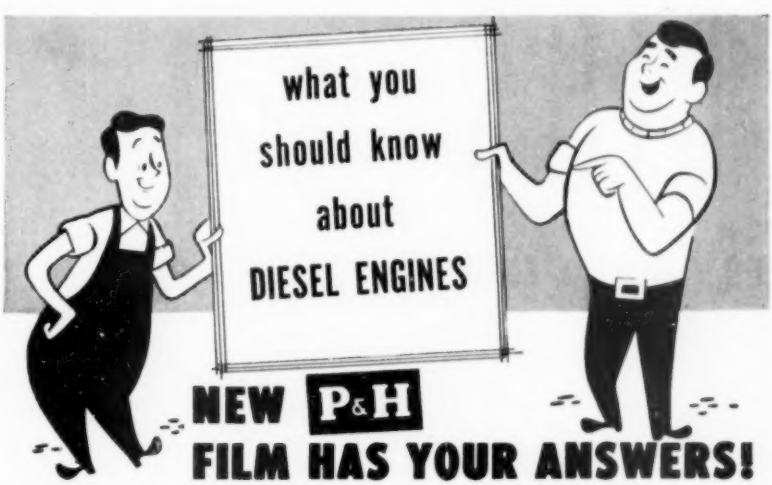
Bulletin 853

5 TYPES FOR EVERY APPLICATION, process, heat, power. Sizes ⅛" to 2"; pressures to 250 lbs.

210 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS



NEW P&H FILM HAS YOUR ANSWERS!

For a quick "Diesel education," you should see this new color slide film. You'll be wiser in the ways of modern diesel engines . . . how they operate . . . how they compare with gasoline engines . . . what they'll do . . . why they'll do it better . . . how diesels save you money.

For a personal showing of "What You Should Know About Diesel Engines," see your P&H Dealer. Or, write us for details.

P&H

DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
CRYSTAL LAKE, ILLINOIS

the P&H line

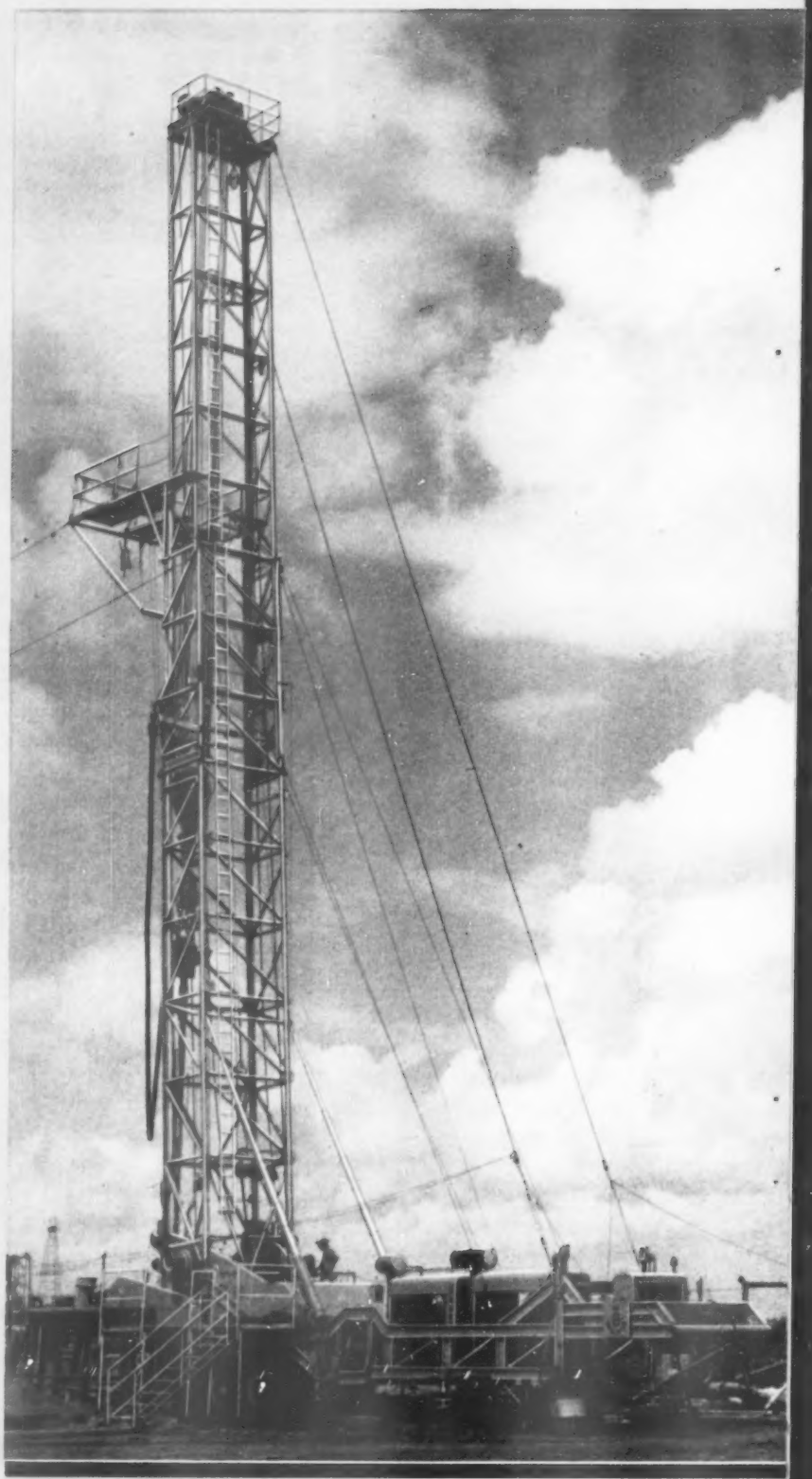
3 Great SLIM HOLE RIGS

FOR 5,000-FOOT TO 10,000-FOOT DRILLING

HIGHLY MOVABLE
Designed for highway moving, yet all full-size drilling rigs.

QUICK RIG-UP
Can be spotted and mast raised in minutes—complete rig-up in 3 to 4 hours.

LOW IN COST
Compare the initial cost with any rig and you'll find more rig per dollar. Check your slim hole drilling rig requirements with CARDWELL. You'll be miles ahead in footage and thousands of dollars in profits.



CARDWELL "TRAILERIG" is best for 10,000-ft. slim hole drilling. Ninety- or 96-foot mast and twin-engine draw works are built into the trailer frame, making a complete, utilized rig.

CARDWELL 152 "TRAILERMAST" with 84-ft., 150,000-lb. capacity mast provides the maximum in movability and rig-up speed. Model AH or Model L single engine draw works can be mounted on trailer frame. Built-in hydraulic system erects mast.

CARDWELL 151 "TRAILERMAST" can be used with Model L, Super S, or Model D draw works, and is moved complete with lines and block reeved up. Ninety-six-foot mast with 150,000 lbs. capacity is raised by draw works mounted on trailer frame.

CARDWELL

REG U. S. TRADE MARK PAT. OFFICE

THIS TRADE MARK INSURES HIGHEST QUALITY AT LOWEST PRICE

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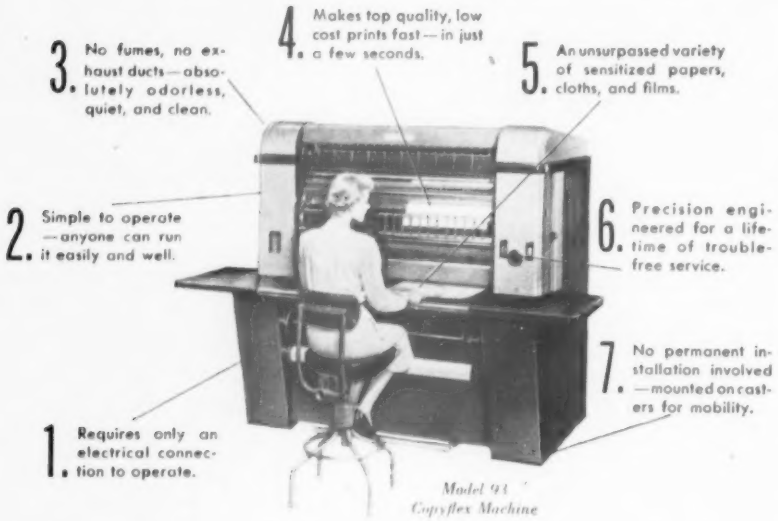
Cable Address "ALL STEEL," Wichita — "CARDSTEEL," New York

Wichita, Kansas, U. S. A.

THERE IS A CARDWELL PARTS STOCK NEAR OR IN EVERY OIL FIELD OF THE WORLD

Seven Good Reasons for Specifying Copyflex for Your Next Copying Machine


3. No fumes, no exhaust ducts—absolutely odorless, quiet, and clean.
4. Makes top quality, low cost prints fast—in just a few seconds.
5. An unsurpassed variety of sensitized papers, cloths, and films.
2. Simple to operate—anyone can run it easily and well.
6. Precision engineered for a lifetime of trouble-free service.
7. No permanent installation involved—mounted on casters for mobility.
1. Requires only an electrical connection to operate.

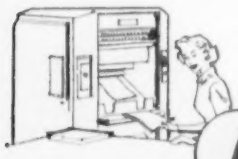
Model 94 Copyflex Machine

Why settle for less when it costs no more to own the one machine that offers *all* the benefits of diazo type, positive black-on-white reproduction?

That's what you get with a Bruning Copyflex. You have all the speed, the economy, and the quality associated with positive black-on-white reproduction . . . plus problem-free installation, ease of operation, and absence of fumes, exhaust ducts, ventilating fans, and similar drawbacks.

Today's Copyflex machines represent 25 years of development by men who are thoroughly familiar with engineer prints and print-making requirements. They are made by the Charles Bruning Company, who introduced the diazo type direct process of reproduction in this country in 1929.

There is a Bruning Copyflex that will exactly fit your requirements. Write us for full particulars.



BRUNING Copyflex

Copies anything typed, written, printed or drawn on ordinary translucent paper—in seconds.

CHARLES BRUNING COMPANY, INC. • 4700 MONTROSE AVENUE • CHICAGO 41, ILLINOIS

Everything for the Engineer and Draftsman

The refining industry should do this immediately, and do it through the individual foresight and action of each refiner. The threatened collapse of the market can be avoided. . . ."

Editorial in the Oil City (Pa.) Derrick.

CALENDAR

MARCH

16-17 Gas Conditioning Conference (formerly Gas Hydrate Control Conference), Extension Study Center, North Campus of the University of Oklahoma, Norman.

17-19 **American Petroleum Institute, Division of Production, Mid-Continent district, Biltmore Hotel, Oklahoma City.**

23-April 1 American Chemical Society, annual meeting, Municipal Auditorium, Kansas City, Mo.

24-26 American Power Conference, sixteenth annual meeting, Sherman Hotel, Chicago.

26 American Chemical Society and Sabine Area American Institute of Chemical Engineers, joint session, Beaumont, Tex.

27 North Texas Oil and Gas Association, annual meeting, Wichita Falls, Tex.

29-31 **Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.**

APRIL

4- 6 Texas Independent Producers and Royalty Owners Association, Rice Hotel, Houston.

5- 7 American Society of Lubrication Engineers, Netherland-Plaza Hotel, Cincinnati.

6 New Jersey Section of the Instrument Society of America, sixth annual symposium, Essex House Hotel, Newark, N. J.

6- 8 Petroleum Industry Electrical Association, annual convention and exhibit, Adolphus and Baker Hotels, Dallas.

7 Packaging Institute, annual spring luncheon, Hotel Dennis, Atlantic City, N. J.

8- 9 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Townsend Hotel, Casper, Wyo.

8- 9 Second annual instrumentation conference, Louisiana Polytechnic Institute, Ruston, La.

12-15 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, joint annual meeting, Kiel Auditorium, St. Louis.

13-15 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

14-16 National Petroleum Association, fifty-first semiannual meeting, Cleveland Hotel, Cleveland.

17 Fourth John Zink Process Heating Seminar, John Zink Burner Co. plant, 4401 S. Peoria, Tulsa.

19-21 National Purchasing and Stores Conference, sponsored by the American Gas Association, Atlanta, Ga.

20-23 Distribution, Motor Vehicles and Corrosion Conference, Operating Section, American Gas Association, Mount Royal Hotel, Montreal.

21-23 1954 Southern Industrial Wastes Con-

REDA PUMPS

FIRST CHOICE for Secondary Recovery Water Flooding...

The lower the expense of producing source water from wells for water flooding operations, the greater the ultimate profit.

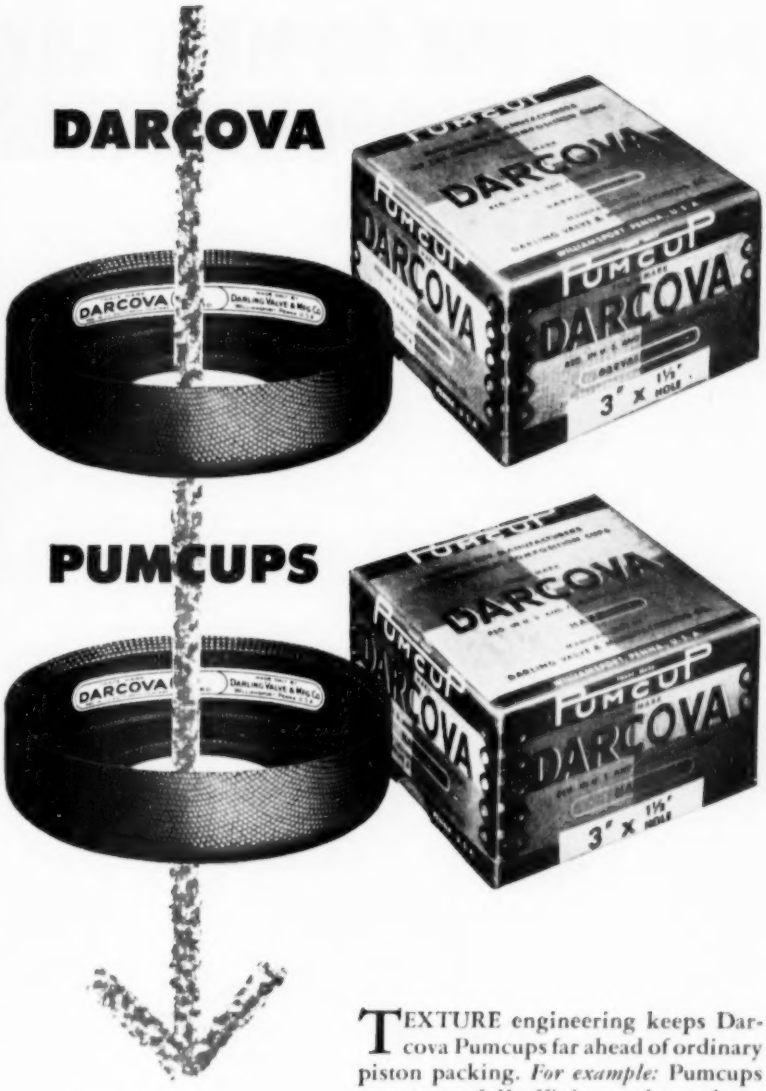
Reda Pumps for source water wells provide many ways for lowering these production costs.

Improved design and longer operating life *lower* the cost of labor per barrel, *lower* the cost of maintenance per barrel, *lower* the investment cost per barrel, *lower* the cost of fluid per barrel.

Also the ability of Reda pumps to produce greater volumes in limited casing sizes and from greater depths often reduces the number of source water wells required.

Reda engineers have long been associated with water flooding operations and are fully qualified to assist operators in discussing their source water requirements.

REDA
PUMP COMPANY
BARTLESVILLE, OKLA.



...famous for

- **PUMPING EFFICIENCY**
- **LOWER COST**
- **LONGER SERVICE**

TEXTURE engineering keeps Darcova Pumcups far ahead of ordinary piston packing. *For example:* Pumcups operate at full efficiency throughout their entire life. Fluid slippage is virtually eliminated.

Moreover, you can count on much longer service . . . users report Darcova Pumcups outlast other packing at least 3 to 1!

Write for all the facts on Darcova efficiency: Bulletin No. 4502 on Pumcups for air and hydraulic mechanisms; No. 4401 on Pumcups for reciprocating pumps.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP

PUMCUPS

DO YOU USE OR MAKE ANY OF THE PRODUCTS IN THIS LISTING?

List of Users

The types of industries listed are all repeat users of **Tru-Lay Push-Pull Controls.** Experimental applications are not shown.

Agricultural Equipment
Air Conditioning Equipment
Aircraft & Parts Automobiles
Bakery Equipment Boats & Ships
Bottling Machinery
Brewing & Distilling Equipment
Business Machines
Buses & Motor Trucks
Candy Making Machinery
Canning Machinery
Ceramics Machinery
Chemical Processing Machinery
Coal Mining Machinery
Coin Operated Machines
Construction Machinery
Dairy Products Machinery
Dental & Surgical Equipment
Die Casting Machinery Diesel Engines
Drinking Water Coolers
Electrical Appliances
Electrical Generating Equipment
Electrical Machinery
Electrical Transmitting Equipment
Electronic Equipment
Elevator Control Panels
Fire Protection Equipment
Food Processing Equipment
Forging Machinery
Foundry Equipment
Gas & Oil Production (Test Stands)
Glass Making Machinery
Grain Processing Equipment
Hat Machinery Heating Equipment
Hydraulic & Pneumatic Equipment
Ice Cream Making Machinery
Laundry & Dry Cleaning Equipment
Leather Working Machinery
Lumber & Saw Mill Machinery
Marine Equipment
Materials Handling Equipment
Metal Mining Machinery
Metal Working Machinery—Machine Tools
Military & Naval Equipment
Motorcycles & Bicycles
Nuclear Science Equipment
Oil Refinery Equipment Ordnance
Packaging Machinery
Paint Making Machinery
Paper Making Machinery
Photo Equipment (manufacture)
Plastics Fabricating Machinery
Plastics Producing Machinery
Power Plant Equipment
Printing & Binding Machinery
Quarrying Machinery
Radio & Television (manufacture)
Railroad Equipment
Road Building & Maintenance Equipment
Rubber Processing Equipment
Safety Locks on Fuse Panels
Sanitation Plumbing (Floor Valves)
Shoe Machinery Steel Mill Machinery
Telephone & Telegraph Machinery
Textile Machinery
Waterworks Equipment
Welding Equipment
Wire Making Machinery
Woodworking Equipment
X-Ray Machines

Whether your interest is in a single application of this versatile

PUSH-PULL CONTROL

or in its inclusion as a component of the product you manufacture, we would welcome your request for our DATA FILE for your further study.

Because TRU-LAY PUSH-PULL CONTROLS are "SOLID as a rod but *FLEXIBLE* as a wire rope" their use has simplified the design and improved the operation of literally hundreds of products as indicated in the accompanying list of repeat users.

These fine controls are designed, and painstakingly built, to have the qualities of ACCURACY, HIGH LOAD CAPACITY, FREEDOM FROM TROUBLE, LONG LIFE, FLEXIBILITY . . . they are frequently and successfully used in conjunction with electrical, hydraulic and air controls . . . they are thoroughly effective under almost any operating condition.

Here are some of the jobs they handle well . . . HOT jobs on jets and industrial furnaces . . . COLD jobs down to −70°F. . . . WET jobs in food processing and marine applications . . . DIRTY jobs in cement mills and coal mines . . . CORROSIVE jobs in chemical processing . . . HEAVY, TOUGH jobs on construction machinery . . . LIGHT DUTY jobs on business machines, drinking water coolers . . . REMOTE jobs 150 feet or more from control point . . . they DAMPEN VIBRATION to protect delicate instruments . . . and LUBRICATION of the inner, working member is taken care of *for life* during assembly.

• The six booklets and bulletins in this DATA FILE will answer further questions you may have about this versatile and dependable tool, and will also provide you with the means of defining to us the application you may be interested in.

Write for a copy without obligation

DATA FILE

ACCO

AUTOMOTIVE and AIRCRAFT DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

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2216 South Garfield Ave., Los Angeles 22 • Bridgeport 2, Conn.

ference, Manufacturing Chemists Association Southern Association of Science and Industry, and the Texas Chemical Council, Houston.

21-23 Natural Gasoline Association of America, thirty-third annual convention, Baker Hotel, Dallas.

22 Illinois Oil and Gas Association, annual membership meeting, Hotel Emmerson, Mount Vernon, Ill.

26-28 Southern Gas Association, annual convention, Houston.

MAY

2- 4 Independent Petroleum Association of America, midyear meeting, Cosmopolitan Hotel, Denver.

3- 5 American Geophysical Union, thirty-fifth annual meeting, National Academy of Sciences, Washington, D. C.

3- 5 Air Pollution Control Association, annual meeting, Patten Hotel, Chattanooga, Tenn.

6- 7 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

9-12 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

10-12 Ninth annual Purdue Industrial Waste conference, Purdue Memorial Union, Lafayette, Ind.

10-12 American Petroleum Institute, Division of Transportation, Products Pipe Line Conference, Warwick Hotel, Philadelphia.

10-13 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.

14-15 Interstate Oil Compact Commission, General Oglethorpe Hotel, Savannah, Ga.

16-19 American Institute of Chemical Engineers, Springfield, Mass.

17-19 American Petroleum Institute, Division of Marketing, midyear meeting, Cosmopolitan Hotel, Denver.

20-21 Kentucky Oil and Gas Association annual meeting, Lafayette Hotel, Lexington, Ky.

24-26 American Gas Association, production and chemical conference, William Penn Hotel, Pittsburgh.

27-28 Natural Gas and Petroleum Association of Canada, Prince Albert Hotel, Windsor, Ont., Canada.

31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

2-4 Southern Gas Association, short course in gas technology, Texas College of Arts and Industries, Kingsville, Tex.

3- 4 Pennsylvania Grade Crude Oil Association, thirty-first annual meeting, Hotel William Penn, Pittsburgh.

6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

13-18 American Society for Testing Materials, annual meeting and exhibit, Sherman and Morrison Hotels, Chicago.

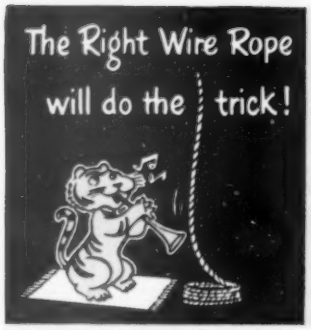
17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada

25-26 Southern Gas Association, transmission management conference, Hotel Adolphus, Dallas.

27

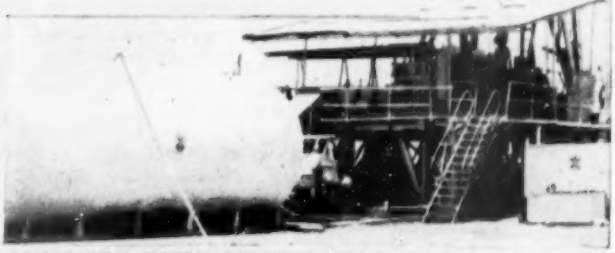
July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting,



"American Wire Lines out-perform any others we have used."

That's Bruce Harp talking— West Texas Drilling Superintendent for Exploration Drilling Co. Here's what he says about American Tiger Brand Wire Lines: "We keep accurate ton-mile records and we know what each one of our lines has done. We've used almost every kind of wire rope there is, but I'll say that American Lines give us the best service of any."

American Tiger Brand Wire Lines give long service because they are especially designed for tough oil drilling service. Tiger Brand Rotary Drilling Lines and Cable Tool Drilling Lines, Sand Lines, Coring Lines, and Winch Ropes provide the strength and wear resistance for every type of drilling job you have. And the American Wire Rope Engineer in your area will be glad to help you choose the ones that will work best on your rig. Just get in touch with the nearest American Wire Line Distributor.



EXPLORATION DRILLING CO.'S Rig #16 is equipped with 8450 ft. of 1⅛" American Tiger Brand Drilling Line, which has an Independent Wire Rope Core and is preformed for better spooling and greater resistance to bending fatigue.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

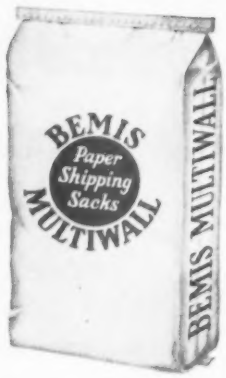
U·S·S AMERICAN TIGER BRAND WIRE ROPE

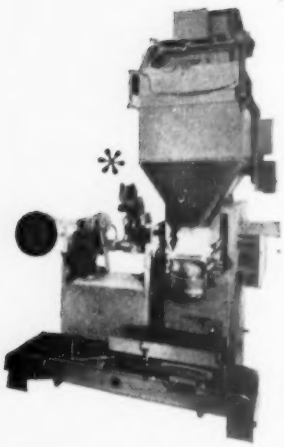
Excellay Preformed

USS

UNITED STATES STEEL

Here's a proved solution to your petrochemical packaging problems





✻ **Depend on Bemis Multiwall Paper Bags**... tailored to your requirements. Bemis' twelve multiwall plants are located to give you unexcelled service.

✻ **Depend on Bemis Gravity Packer** ... for fast, economical weighing, filling and closing of Bemis Multiwalls.

✓ **Depend on Bemis Packaging Service** ... for specialized aid in plant layout or installation ... in fact, for almost any type of packaging help. Our trained Factory Representatives are at your call.

✓ **Other Bemis Bags for the Oil Industry**... Bemis is a supplier of all types of bags for the oil industry: Wax bags—either cotton-lined burlap or waterproof (laminated-textile) bags—core sample bags, etc.

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General Offices—St. Louis 2, Mo.
Sales Offices in Principal Cities

Manoir Richelieu, Murray Bay, Que., Canada.

JULY

23 Southern Gas Association, communications conference, Rice Hotel, Houston.

24 Southern Gas Association, dispatchers' conference, Rice Hotel, Houston.

AUGUST

17-19 Society of Automotive Engineers, Inc., international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

20 Southern Gas Association, natural-gas processing conference, Herring Hotel, Amarillo, Tex.

21 Southern Gas Association, pipe-line operations conference, Herring Hotel, Amarillo, Tex.

SEPTEMBER

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

9-11 Interstate Oil Compact Commission, Omaha, Neb.

12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.

16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

25 Southern Gas Association, compressor-station conference, Captain Shreve Hotel, Shreveport, La.

OCTOBER

2 Southern Gas Association, right-of-way conference, Peabody Hotel, Memphis, Tenn.

4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.

7-8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.

9 Southern Gas Association, field production of natural gas roundtable, Rice Hotel, Houston.

11-13 American Gas Association, annual convention, Atlantic City, N. J.

11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.

12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.

14-17 Permian Basin Oil Show, Odessa, Tex.

16 Southern Gas Association, transmission management conference, Rice Hotel, Houston.

17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.

24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.

26-27 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

NOVEMBER

4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

28-Dec.

3 American Society of Mechanical Engineers, Statler Hotel, New York.

Tripplehorn PARAFFIN SCRAPERS

Still the BEST ANSWER to Paraffin in Pumping Wells!

New Improvements:

1. New specially processed, cold-rolled, scale-free steel.
2. Latest heat treating with atmosphere controlled furnaces.
3. New design end forming.

These improvements have resulted in perfect Triple-Spiral Spring-tempered Scrapers.

OTHER ADVANTAGES:

- No Welding — installed at the well.
- SAVES TIME AND MONEY, CAN BE RE-USED on replacement rods.
- May be spaced for any stroke length.
- Will not slip if rod is stressed. Tested for 2350 lbs. grip.
- Now in use in EVERY PARAFFIN AREA.
- Sizes available for IMMEDIATE DELIVERY — TO FIT ⅝" to 1" rods in 2", 2½", and 3" tubing.

Conveniently packaged and easily identified!

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The TRIPPLEHORN CO.

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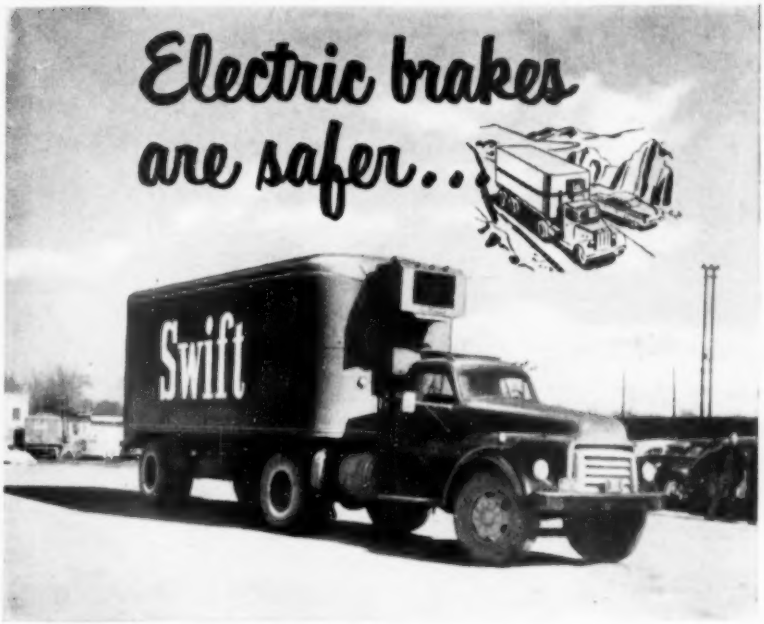

two independent braking systems!

Protection of costly equipment . . . cargos arriving in good condition . . . continued profitable operation of your business . . . all depend on *safe* truck operation. The hazards of mountain highways, crowded city streets, slippery country roads must be insured against. That's why leading trucking firms across the country are turning to Warner Electric Brakes. With two independent braking systems, even if the air or hydraulic brakes on the tractor fail, electric brakes on the trailer will bring the train to a safe stop. Many other advantages make Warner Electric Brakes the cheapest insurance you can buy. For full particulars on price, installation, etc. see your Warner distributor or write Warner Electric Brake & Clutch Company, Beloit, Wisconsin.

WARNER ELECTRIC BRAKES

"your greatest insurance policy for highway safety!"

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OPEN THE DOOR TO BIGGER DRILLING PROFITS

GLOBE "2-cutter"
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THE OIL AND GAS

JOURNAL

TULSA, OKLAHOMA

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JOURNALLY Speaking

Compact Wisdom

JUST about the slickest little book on the how and why of oil that we ever saw just reached us through the courtesy of the Interstate Oil Compact Commission in Oklahoma City.

It's designed to answer questions, and it really answers 'em. In fact, it's a vest-pocket short course on how and where oil is found and produced, oil law and property rights, how conservation laws came about, and how they conserve oil.

The Compact office gets zillions of questions about oil from all sorts of people—school kids, teachers, editors, congressmen, royalty owners, and John Q. Public. A few years ago it published a leaflet on about the grade-school level, and later it compiled a semitechnical book on "Oil and Gas Production." Its latest production, an 84-page booklet called "Oil for Today and for Tomorrow," is on the high-school or college level.

When we said it was slick, we meant that it is on slick paper and is full of slick illustrations. It's also a slick job of writing, for while it has half a dozen authors, the chapters all dovetail together very neatly. The authors include lawyers and engineers, but they all managed to keep away from technical terms and make their pieces simple and easy to read.

As might be expected, one of the main objectives of the little book is to explain conservation laws and defend the system against the silly charges that keep arising, such as that proration and similar rules are socialistic, a cloak for fixing prices, or a scheme by which the big companies rook the small operators. It achieves that objective very effectively, and in doing so it also gives a lot of general information about the oil industry.

Part of the book was written by the Compact Commission staff, but to be sure that all viewpoints were represented, chapters were contributed by such people as George W. Hazlett, a lawyer; Herman H. Kaveler, a petroleum engineer; Harold B. Fell, an independent producer; and Lt. Gen. Ernest O. Thompson, commanding general of the Texas National Guard.

The Compact people figured the book would be popular so they are printing something like 400,000 copies, but already more than half the supply has been bought by oil companies for distribution to their employes and customers and to people who ask them questions about conservation. However, we understand that while the supply lasts practically anybody can get a copy for the asking.

Essential Commodity

IN spite of a congressional investigation, a buyers' strike, and the visit of four American clubwomen to Brazil, it looks as though the price of coffee will keep right on climbing, and this poses a serious threat to the oil industry. Either drilling will have to shut down for lack of coffee or else the price of crude will have to be advanced to cover the additional cost of this essential commodity.

For oil wells can't be drilled without coffee. No self-respecting drilling crew would think of standing a tour without an ample supply of coffee close at hand. There's always a pot of it around somewhere, usually perpetually warmed by a steam line or exhaust pipe. Coffee on a drilling rig is just as necessary as mud—and sometimes almost as thick.

This was particularly true in the old days down in Louisiana and along the Gulf Coast, where the Cajuns taught everybody to drink that strong, thick, authoritative brew so characteristic of the region, and where amber, anemic, "Yankee" coffee is held in great contempt. Every crew had a pot on the steam jacket, and was insulted unless a visitor asked for a cup as soon as he stepped on the floor.

Since then the coffee pot has accompanied the rotary table to every active area on the continent, and while there may be regional preferences as to blend and brew, it takes a lot of coffee to put down the average oil well. No coffee, no oil.

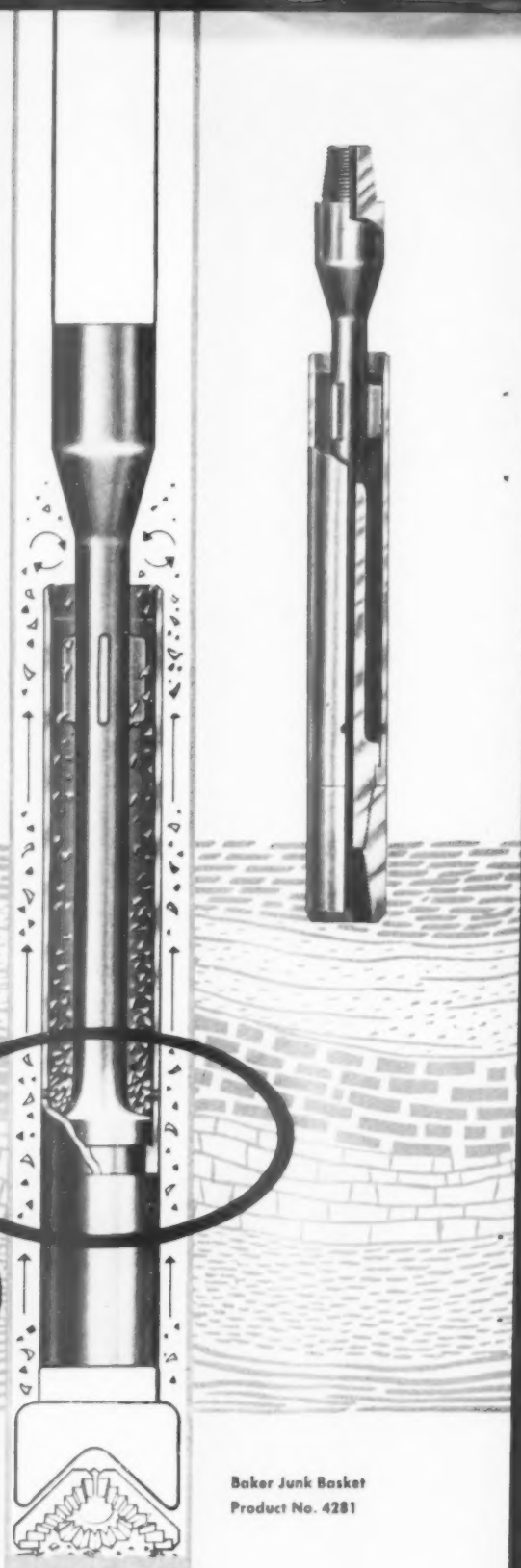
—Henry D. Ralph.

THE BAKER JUNK BASKET safely traps, retains and removes from the well cuttings from "drilled-out" cast-iron, aluminum alloys, bronze or other dense, but "drillable" materials. Its design is simple and sturdy, and is readily understood by referring to the sectional illustration (upper right). Between the short Drill Collar (top) and the Drill Collar Sub (bottom) a Cylinder is mounted to provide a basket for trapping a considerable quantity of metal cuttings. When drilling out Baker Cement Retainers, Baker Bridge Plugs, Baker Production Packers, or other devices made of cast iron, aluminum alloys and similar "drillable" materials, a Baker Junk Basket (Product No. 4281) is positioned just above the rock bit, or diamond point bit.

SIMPLE, POSITIVE OPERATION—Cuttings from the drilling bit are carried upward by the high velocity of the circulation fluid through the comparatively small annulus around the Cylinder (see illustration). Now note how the annulus is *abruptly enlarged* due to the smaller diameter of the Drill Collar. When the circulation fluid reaches this enlarged annulus the velocity of the fluid is so greatly reduced that the cuttings are no longer carried upward, but drop into the basket (Cylinder) where they are trapped and recovered when the Junk Basket is removed from the well.

catch those metal cuttings with a...

BAKER JUNK BASKET



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The "oil lobby" makes its annual appearance

A CHANGE in the oil and gas depletion allowance is being sought by some members of Congress, as happens every time there is a revision of the tax laws. And, as usual, this historic revenue provision is currently the subject of bitter denunciation by certain politicians and publicists.

But—again as usual—there is a dearth of factual criticism of the provision itself or of its operation. Instead the opposition takes the form of vitriolic attacks on what is sneeringly called the "oil lobby".

Every time Congress has calmly evaluated the depletion allowance on its merits it has retained the provision in the law. In spite of this, some people persist in believing that there is something unfair and unholy about letting oil producers deduct 27½ per cent of something (they seldom specify what or why) in computing their income tax.

The accounting technicalities and the economic consequences of the depletion allowance *are* rather difficult to explain. That's why people not well versed in either subject find it easier to impugn the morals, finances, and politics of oil men than to grapple with the real facts of oil depletion.

So they call it a "special privilege," rail against "oil-rich millionaires," and imply that the government is financing the wanton drilling of dry holes. And they allege that the law is kept on the books solely because of nefarious activities of a mysterious and powerful oil lobby.

ALL right, so there *is* an oil lobby, and it *is* powerful. But it isn't mysterious and it isn't nefarious. It is composed of every individual who has any connection, direct or indirect, with the production of oil or gas.

This lobby brings pressure on Congress in many ways: by publishing accounting studies and economic theses; by factual briefs and presentations in open committee hearings; and by private conversations with members of Congress. Much of this is done by established trade associations organized primarily for other purposes.

But whenever the depletion allowance is in danger, hundreds of individuals talk with their own congressmen on their own initiative and in their own ways. Some of them are rich, some are poor; some are oil producers, some aren't; some are heavy contributors to the campaign funds of one or another political party, some don't give a dime.

All of them are exercising the privileges of every citizen in explaining to their elected representatives how the depletion allowance enables the industry to keep on finding oil. That's the kind of "political pressure" that forms the foundation of our government.

That's all there is to the oil lobby, and it's nothing to be ashamed of. Right now is the time for this lobby to get into high gear again.

That's Anchor, ready to help you with all your marketing-transportation problems. Your specialty is production and/or refining. Our specialty is marketing petroleum products. Turn your marketing to us and have more time for your specialty. We have the knowledge, the facilities and the desire for your business. Call us, now, 2-7261, Tulsa.

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THIS WEEK... ...IN THE NEWS

SHELL'S WILDCAT which promises to bring Nevada in as the nation's twenty-ninth oil-producing state last week was drilling ahead below 7,300 ft. No tests have been reported since Shell announced recovery of black oil from the interval between 6,538 and 6,724 ft. The test, the 1 Eagle Springs Unit is being drilled in Nye County, near Elko.

DRILLING—New contract drilling firm is building a portable drilling barge designed to drill in offshore depths up to 45 ft. . . . The new firm, American Tidelands, Inc., expects delivery on the new barge by December and will begin operations soon thereafter. . . . ¶Sun Oil Co. and Phillips Petroleum Co. have indicated Mission Canyon production in a test in the Brorson area of Montana. . . . ¶Monterey Oil Co. nears completion of its drilling island offshore from Seal Beach, Calif. . . . First well from the island expected to spud in shortly after April 1. . . . ¶Economic depth of Cambrian production creates new interest in West and West Central Texas. . . . Latest Cambrian strike is Skelly Oil Co. 3-B Boyd in North Dora field. . . .

PRODUCTION—Elk Hills field, U. S. Navy Reserve, would probably rank as California's largest producing field today if it were not shut in. . . . The field's productive capacity has increased to 130,000 bbl. daily while Wilmington, the top field for a decade, has declined to 120,000 bbl. and is still falling off. . . . ¶A battle over cycling or pressure maintenance program for East Texas' Woodlawn field hits the Texas Railroad Commission. . . . Group of 24 independent operators propose cycling and are opposed by Stanolind Oil & Gas Co., the field's largest producer. . . . ¶Railroad Commission denies application of Moncrief interests for rehearing in SACROC order. . . .

INTERNATIONAL—Turkish National Assembly passes new oil law denationalizing Turkey's oil industry. . . . Unexpectedly strong political opposition to new law brought modifications in original bill, but legislation is still regarded as satisfactory to foreign oil operators. . . . ¶Egypt, Anglo-Egyptian and Socony-Vacuum settle dispute between the government and the two companies that has hobbled new exploratory work in Egypt for 6 years. . . . Dispute centered around government's system of pricing products on the domestic market. . . . Executives of international companies continue London talks in effort to select commission to present marketing plans of group to Iranian Government.

ACTIVITY—Production of crude and lease condensate averaged 6,437,875 bbl. daily for week ended March 6, up 132,000 bbl. daily. . . . ¶Total well completions for the week dropped 34 wells to 965. . . . ¶Wildcat completions decreased 24 wells to 167. . . . ¶Rotary rigs operating in the United States totaled 2,568 on March 8 compared with 2,450 on corresponding date last year. . . .

TRENDS—Total demand for all oils averaged about 8,510,000 bbl. daily for 4-week period ended March 6, down about 0.7 per cent from same weeks last year. . . . ¶Total demand in January was about 9,200,000 bbl. daily, up 6.5 per cent from previous year and the first month with average above 9,000,000 bbl. . . .

PIPE LINES—Joint Chiefs of Staff are expected to give a decision on whether West Coast Pipe Line Co.'s proposed Texas-to-California crude line is essential to national defense. . . . ¶New automatic welding machine utilizing a shielded electric arc to break aluminum oxide film on aluminum pipe makes use of lightweight pipe practical. . . . ¶Officials of Trans-Canada Pipe Lines, Ltd., expect to let contracts for huge Alberta-to-eastern Canada natural-gas line by last of April or first of May. . . .

West Coast Line Decision Near

Defense chiefs expected to rule shortly on whether huge crude line to California is essential to national security

Robert J. Enright

DALLAS.—Plans of West Coast Pipe Line Co. for a Texas-to-California crude line last week were nearing a climax.

Discussions in Washington involving L. M. Glasco, West Coast president, and the Joint Chiefs of Staff pointed to an immediate decision on whether the line will be given military blessing as essential to national defense.

If this should happen, the Petroleum Administration for Defense would recommend issuance of a certificate of essentiality. With this certificate, West Coast would be expected to approach the Treasury Department for a guarantee of a minimum average throughput of 75,000 bbl. daily.

This is the throughput which, with a 60-cent a barrel tariff, would be required for the line to break even, according to Ebasco Services, Inc., engineers on the project, and financing institutions involved.

Glasco would not comment on West Coast's next step if certificate is refused.

Defense argument . . . West Coast bases its case as to the line's desirability from the defense standpoint on these arguments:

. . . West Coast production must be supplemented with imports to meet both civilian and military demand.

. . . These imports could be cut off in wartime either by submarine attacks on tankers or by enemy action against the Panama Canal, which is regarded by some top military men as vulnerable to such an attack.

. . . In the event of a national emergency, demand for oil on the West Coast would increase sharply.

. . . In the event West Coast refineries were bombed out, the line could be converted relatively quickly to products service.

Glasco sums it up this way: "There is a pipe-line network of 168,000 miles connecting the oil-producing states in the Southwest and Mid-Continent with the North and East and not a single mile of oil pipe line connecting the oil-short West Coast with these states. Waiting to build a pipe line to the West Coast after an emergency arises and steel and manpower are in short supply is just like locking the barn door after the horses are out."

Financing problem . . . Glasco said the sole reason for seeking a government guarantee is to obtain financing, that actual initial throughput would be well above 75,000 bbl. Ebasco Services, in an economic survey filed with the application for the certificate, stated the line would have 175,000 bbl. daily tendered for shipment at the time it is completed.

West Coast has engaged White, Weld & Co. and Union Securities Corp., both of New York, to arrange financing. The company secured a letter of intent to attempt such financing from these firms on July 1, 1952. They have failed to date, West Coast says, because Metropolitan Life Insurance Co. and New York Life Insurance Co. made demands with which the company could not comply. These were to the effect that West Coast secure:

. . . Substantial investments in common stock by responsible oil companies:

. . . Binding contracts from oil producers in West Texas to sell the oil to the pipe line at definite prices over a period of time.

. . . Binding contracts from oil companies with good credit to buy the oil at the California end at prices calculated to cover all interest and sinking funds on the bonds.

West Coast anticipates that financial backing is virtually assured provided it gets the government guarantee.

Adequate crude and market . . . West Coast, Glasco says, right now has lined up sufficient crude reserves in the Permian basin of West Texas and New Mexico to make up daily deliveries of between 100,000 and 125,000 bbl. of oil daily through the 1,030-mile, 24 and 26-in. carrier from Midland, Tex., to Norwalk, Calif.

Furthermore, he contends, the company could sell all of this crude to West Coast independent refiners.

If the certificate of essentiality of the line is issued, West Coast says it will be prepared to show the Treasury Department that West Coast refiners will buy the oil and that Texas and New Mexico producers will use the line.

Currently, the largest firm contract for crude oil to enter the line has been the one negotiated by Exchange Oil Purchasing Corp., a West Coast Pipe Line affiliate, with the state of New Mexico. This provides that West Coast has first call on the state's royalty oil, amounting to about 17,500 bbl. per day, for a period of 10 years.

A similar offer was made by the company to the State of Texas for royalty oil, but no action has been taken to date.

Economics . . . West Coast says most of the oil going through the line would be 40°-gravity and above. The present posted price of West Texas 40°-gravity crude is $2.77, while the price of the same gravity crude in southern California is $3.52. Thus the high-gravity West Texas crude would sell at Los Angeles at $3.37 per barrel—15 cents per barrel below the price for the same grade of California oil.

If the tariff were reduced to 50 cents, a possibility which West Coast Pipe Line is considering, the differential would be 25 cents per barrel.

About 75 per cent of California crude is 29° gravity or below and oil above 40° gravity is practically nonexistent as far as the smaller independent refiners with no import connections are concerned. California gasoline has a lower-octane number and a higher refinery price than almost any other area in the United States. Therefore it is believed that Permian crude would find a ready market in the Los Angeles area.

Importing companies on the West Coast — namely Standard Oil Co. of California, Tide Water Associated Oil Co., and The Texas Co. — indicated while nominating for Texas crude in March that their imports would total an average 62,000 bbl. daily for the 5-month period from February through June.

The total imports figure is swelled substantially by the imports of products into the West Coast area which are refined from Texas crude at Gulf Coast refineries, and which, West Coast says, would be manufactured in California if the crude were available.

Long fight . . . West Coast's fight to build its crude line to California has been a long and uphill one. Glasco launched it in 1944.

It is traditionally difficult for a com-

mon-carrier crude line backed by interests which have neither large production at the originating point or refineries at the terminal to obtain financial backing for such a project. It is equally difficult for such a project to acquire a crude supply from companies with sufficiently large production at the one end and to sell the crude to firms with large refineries at the other. These large oil companies feel that if such a line is built, it is cheaper and more desirable all the way around for them to build it themselves.

In addition to being reluctant for the line to be built for these conventional reasons, the larger West Coast operators foresee the danger of a sizable cut in the price of crude in California if and when the cheaper West Texas oil starts coming in. As Glasco puts it, "Either the price of West Texas crude will go up, or the price of California crude will come down."

There is still another reason. Some of the large operators on the West Coast are part owners of the big Trans Mountain crude line completed last fall from fields in Alberta to Vancouver, B.C., and the Pacific Northwest of the United States. Much of the West Coast market is expected to be taken by Canadian crude through this new line.

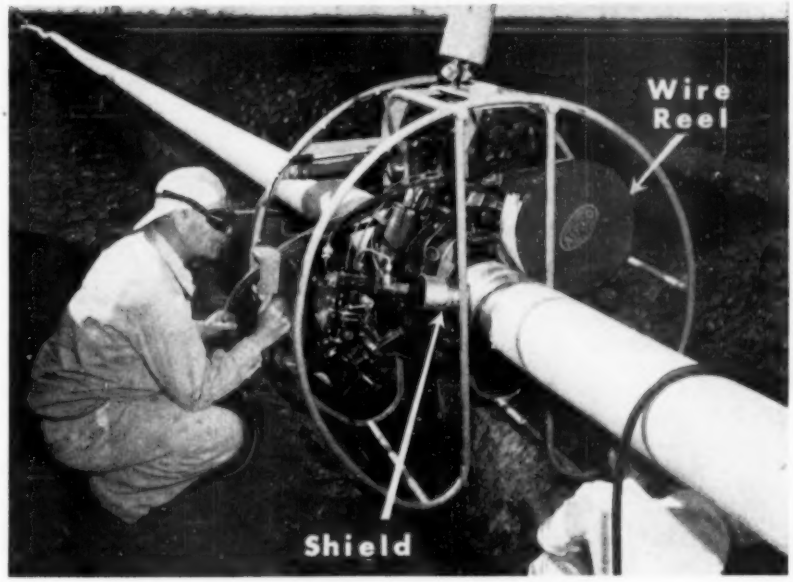
Deal fell through . . . West Coast Pipe Line at one time last year came close to wiping out this major-company opposition and to solving its supply and market problems with one stroke.

It had in the making a deal whereby El Paso Natural Gas Co. would purchase approximately 34 per cent of the stock of West Coast and supply management for construction and operation of the line. Continental Oil Co., Houston, and Union Oil Co., Los Angeles, together would purchase another 25 per cent of the stock. The remainder would have been retained by Messrs. Glasco and Hull and the financing firms.

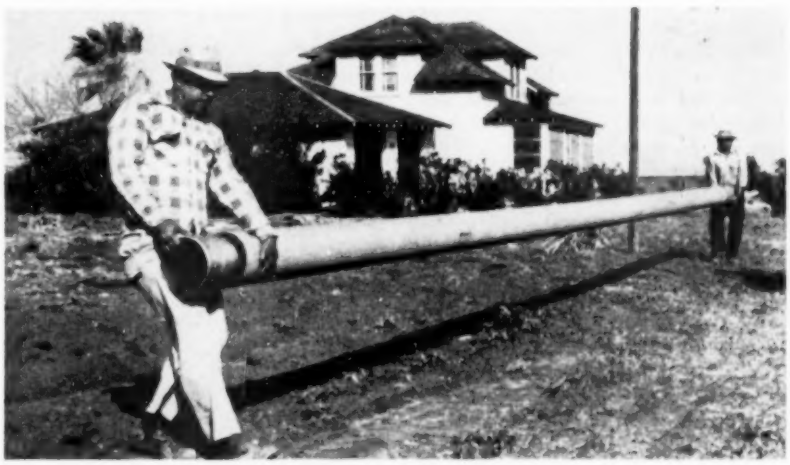
El Paso, as part of the plan, was to furnish between 20,000 and 30,000 bbl. of natural gasoline, butane, and propane as byproducts of casing-head gas purchased for its pipe lines going to the West Coast. The light products would have been mixed with the crude, thus raising the gravity and increasing its value to California refiners.

El Paso looked upon the deal as desirable because much of the wet gas it has contracted to buy in the Permian basin cannot be produced without oil and the restricted markets for crude in this area at that time threatened to reduce gas production.

The El Paso-Conoco-Union deal did not jell for reasons which West Coast refuses to disclose.



Automatic Welder Makes . . .



. . . Aluminum Pipe Practical

F. Lawrence Resen

CORPUS CHRISTI. — The welding bottleneck—stumbling block of aluminum pipe lines—has been licked by a new portable, automatic welding unit.

Developed by Reynolds Metal Co. and Air Reduction Sales Co., the unit was demonstrated in the laying of a 12-mile, 8⅝-in. aluminum gas line from White Point field to Reynolds' La Quinta aluminum plant near here.

In field application, it completed four-pass welds on the line in an average of 2 minutes. Its speed not only contributes to faster laying time but also to a stronger line.

The unit utilizes a shielded electric arc which breaks the tough aluminum oxide film which forms on all aluminum, and then surrounds the area with inert gas while welding takes place.

In a similar method using a manual tungsten arc weld shielded with inert gas, the time element was such that the temperatures at which the oxide disintegrated weakened the structure of the pipe. With a calculated bursting pressure of 2,100 lb., the aluminum pipe had its actual effective strength reduced to withstand a pressure of but 1,400 lb.

The rapidity with which welds may be made with the automatic unit cuts down the length of time the pipe is exposed to high welding temperatures. In tests conducted at the yard coating site, automatically welded sections of aluminum pipe were capable of with-

standing 1,800 psi., a considerable increase over manual welds.

How it works . . . The welding machine is equipped with clamps for gripping the pipe while the welding gun traverses the circumference of the pipe. One electric motor drives the gun, while a second feeds it with aluminum wire from a reel mounted on the unit. The entire unit is synchronized so that the wire is fed into the gun only while welding is taking place, and the speed of the travel of the gun around the pipe is synchronized, in turn, with the wire feed rate.

Simplification has been the keynote in the development of the unit. It is a push-button operation once it has been placed on the pipe, aligned and clamped into position—a matter of moments. The entire unit is surrounded with a guard rail, and totals about 200 pounds, with a truck supporting necessary generators, gas cylinders and auxiliary equipment.

In the actual laying of the gas line, the joints were first spot-welded after external clamps lined them up. Then the welding machine was lowered over the joint and the automatic welds made.

The joints of pipe were yard-coated, and wrapped before the pipe stringing and each weld was wrapped before lowering in the pipe.

The line was designed to handle 500 psi. gas for plant operations at La Quinta, but it was finally tested with gas at 1,000 psi.

The pipe used was extruded at Reynolds' Phoenix, Arizona mill and yard-coated by Rosson-Richards Co., Corpus Christi. Pipe-line construction was by Mitchell Darby Construction Co., McAllen, Tex.

Court Upholds Price Ruling

DENVER.—The U.S. Circuit Court of Appeals affirmed a lower court's decision holding that the Oklahoma Corporation Commission has the right to change a written contract price for natural gas purchased at the well head.

The court ruled that Phillips Petroleum Co. must pay the price of 9.8262 cents per M.c.f. set by the commission rather than the 4 cents per M.c.f. price contracted with Cabot Carbon Co. before the commission raised well-head prices in Panhandle field.

The case went to court when Cabot filed suit against Phillips on November 28, 1952, alleging Phillips was obligated to pay the higher price.

Weather Cuts Fuel Use

NEW YORK. — Standard Oil Co. (N. J.) estimates the nation's use of home heating oils last year was 50,000,000 bbl. less than expected because 1953 was the warmest year since World War II.

Jersey Standard's weather study, figured in weighted degree days, indicated that weather averaged 12 per cent warmer than normal for the year as a whole. Weather during the first quarter of 1953 was 13.1 per cent warmer than normal, while the fourth quarter was 14.2 per cent warmer than normal.

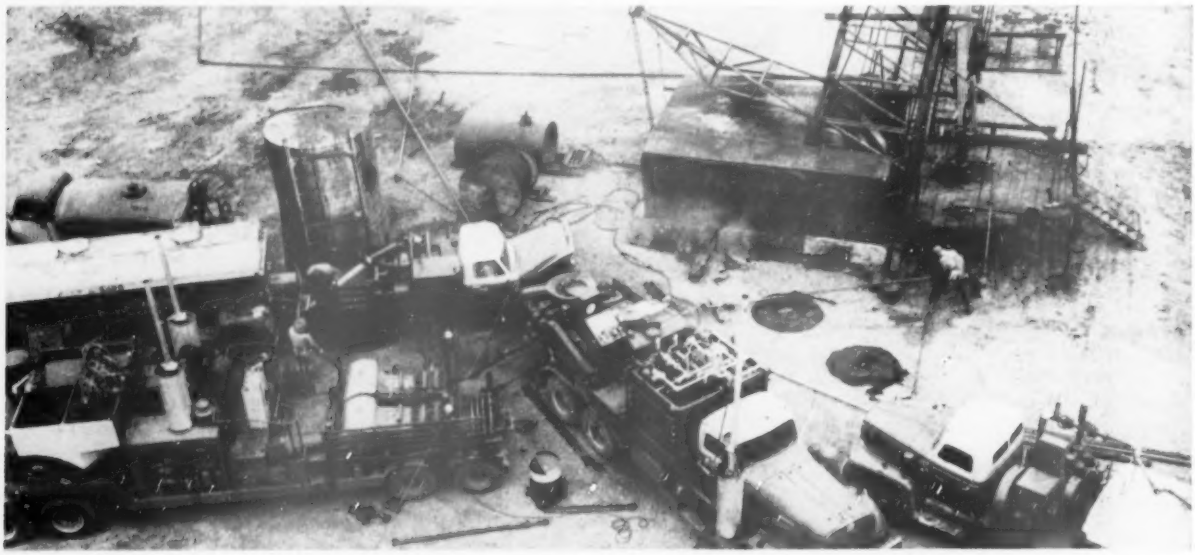
A degree day is based on each degree drop in average temperature below 65°—for example, a 24-hour period during which the average temperature is 50° measures 15° days. Jersey Standard figured the heating oil usage drop as a saving of one 250-gal. oil tank per average user in the United States.

Transmission Panel Slated

HOUSTON.—Eight of the top operating men in the transmission phase of the natural-gas industry will participate in a panel discussion on transmission during the Southern Gas Association's forty-sixth annual convention here April 26-28.

Serving as moderator of the panel, which will be held in the afternoon April 27 in the Rice Hotel, will be H. F. Steen, vice president and general superintendent of El Paso Natural Gas Co., El Paso, Tex. Panel members will be W. T. Hollis, El Paso Natural; J. W. Polkinghorn, Texas Gas Transmission Corp., Owensboro, Ky.; H. W. Egger, United Gas Pipeline Co., Shreveport; W. B. Hass, Northern Natural Gas Co., Omaha; M. O. Sharpe, Trunkline Gas Co., Houston; G. W. Gibbs, Natural Gas Pipeline Co. of America, Chicago; and T. K. Davis, Tennessee Gas Transmission Co., Houston.

E. N. Henderson, Arkansas Louisi-



Latest in Fracturing Equipment Goes to Work

The new trailer in the left foreground is one of the latest items of equipment developed to accomplish high-pressure fracturing with large volumes of fluid and sand. Built by Halliburton Oilwell Cementing Co., the trailer mounts two 300-hp. engines and two high-pressure triplex pumps in parallel. The unit can pump the treating mixture at a rate of 17½ bbl. per minute at 1,000 psi. This photo shows the new equipment performing a fracturing job on Magnolia Petroleum Co.'s 11 Humphrey in southern Oklahoma's Sholem Alechem field. Here 5,000 gal. of oil and 10,000 lb. of sand were injected into the Deese sand.

ana Gas Co., Shreveport, will report on an S.G.A. pulsation-research project at an afternoon transmission session April 26, also in the Rice Hotel.

The annual convention this year is drawing the largest advance registration in the organization's history, an S.G.A. spokesman said last week. Registration is expected to reach about 2,000.

All sectional meetings will be held in the Rice Hotel, while the general session, at which S.G.A. president H. K. Griffin and managing director R. R. Suttle will speak, is slated for the Shamrock Hotel April 27.

Synthesis Levels Off

'53 Petrochem output gain may be less than estimates

WHILE preliminary figures indicate that 1953 showed a new record output of chemicals derived from petroleum and natural gas, the gain over 1952 may prove to be less than previously estimated from production through 1953's third quarter.

This is due to a levelling off in the synthesis of some heavy tonnage chemicals and a second-half decline in others.

No firm figures on total petrochemical output are yet available for 1953. But monthly reports on certain key intermediates and basics point to the general trend. The following table lists seven major aliphatic intermediates and three aromatic basics, showing their production over the recent 2-year period.

	1953			1952
	First Half	Second Half	Total	Total
	(Millions of pounds)			
Acetic acid, synthetic	230	237	467	376
Acetic anyhydride	413	393	806	693
Acetone	269	253	522	438
Ethyl acetate	43	38	81	73
Ethylene glycol	344	287	631	761
Methanol, synthetic	511	556	1,067	1,044
Propylene glycol	32	26	58	91
	(Millions of gallons)			
Benzene, petroleum	26	24	50	35
Toluene, coal tar and petroleum	47	50	97	50
Xylene, coal tar and petroleum	47	54	101	72

The sampling of aliphatic intermediates shows that of the seven reported, five showed curtailed production during the second half of the year as compared with the first half. On an annual basis, only ethylene glycol and propylene glycol fell short of the 1952 production. Others like synthetic methanol, acetone and ethyl acetate showed only small increased production over the previous year. Petrochemicals provide a major source of these intermediates.

In the aromatics, substantial gains were made last year over 1952 output but comparisons of the first and second half production indicated a levelling off. The benzene figures represent only that fraction of production from petroleum, while toluene and xylenes show total production from both petroleum and coal tar.

The source of data is the monthly report compiled by the Chemical Division of the United States Tariff Commission. Preliminary totals for basic petrochemical production during 1953 will be released in about 2 months.

Secondary Recovery Lauded

TULSA. — Additional recovery of 3,000,000,000 bbl. of oil resulted from secondary recovery processes of all types, including pressure maintenance, from 1937 to 1952, according to Albert E. Sweeney, Jr., who predicted that another 3,000,000,000 bbl. of oil will be produced by secondary-recovery methods between 1952 and 1957.

Sweeney, director of the secondary-recovery division of the Interstate Oil Compact Commission, told the Engineers Club of Tulsa last week that authorities estimate that between 7,000,000,000 to 12,000,000,000 of oil left in place in old fields will be recovered.

He said, however, he is confident that with the widespread adaptation of secondary-recovery methods much of the 32,000,000,000 bbl., which the American Petroleum Institute estimates is left in reserve, will be recovered.

Reviewing past and present secondary-recovery activity, Sweeney estimated that secondary recovery accounted for 425,000,000 bbl. of the total U. S. production of 2,228,954,000 bbl.

A.P.I. Okays A.S.T.M. Note

NEW YORK.—The American Petroleum Institute has endorsed the American Society of Testing Materials' explanation clarifying interpolation procedures for Table 5 of its Petroleum Measurement Tables.

The expanded explanation of the interpolation procedures provides a clearer understanding of the new method of computation to be employed with the A.S.T.M. tables which were approved by the A.P.I. last September.

Copies of the expanded explanation, included in the fourth printing of Table 5, may be obtained by writing the A.S.T.M. at 1916 Race Street, Philadelphia 3, Pa.

Expansion Program Planned

CHICAGO. — A 2-year expansion and modernization program calling for expenditure of about $500,000,000 was announced by Standard Oil Co. (Ind.) in its annual report to stockholders.

The company said nearly half of the planned expenditure will go into development of new crude oil production and reserves.

Industry Briefs

WICHITA, Kans.—The Kansas Corporation Commission has postponed from March 26 until April 27 hearings on proposed changes in general rules and regulations for conservation of crude oil and natural gas.

LITTLE ROCK, Ark.—W. R. Stephens & Co. here has purchased Arkansas-Oklahoma Gas Co. for $6,350,000. Arkansas-Oklahoma will be liquidated with its producing properties to be operated by Stephens and its transmission and distribution facilities to be sold to Fort Smith Gas Co., controlled by Stephens, for $2,000,000.

HOLLIDAY, Tex.—Murphy Oil Co. of Oklahoma, Inc., has entered North Texas oil operations with the purchase of two leases totaling 352 acres near here in Wichita County. The leases include eight flowing wells with a total daily allowable of about 500 bbl. Murphy has made locations for three more wells. Sale price was not announced but tax stamps on transfer papers indicated it was in excess of $700,000.

AUSTIN.—Gen. Ernest O. Thompson has announced he will seek reelection to the Texas Railroad Commission. Thompson, 61, has been on the commission since 1932 when he was appointed to an unexpired term.

DENVER.—J. A. McRae has formed Roden & McRae Drilling Corp. and J. A. McRae, Inc., with headquarters here. Property formerly owned by Roden, Darden & McRae, Ltd., which included production in Texas, Oklahoma, Colorado, Wyoming and Montana, is now held by J. A. McRae, Ltd. Officers of the drilling firm, a closed corporation, are: McRae, president; John Roden, executive vice president; E. C. Dorroh, vice president; Leslie Walker, secretary; and Mrs. Vera Lantz, treasurer.

LOS ANGELES.—Tide Water Associated Oil Co.'s 1,450-man Avon refinery crew has completed over 1,000,000 consecutive man-hours of work without a single disabling injury for the third time. During 1953 the refinery reported a rate of 1.72 accidents per million man-hours, compared with 7.02 for the average of other refineries in the petroleum industry.

Gas-Line Operations Reviewed

Annual A.G.A. operating meeting takes up construction, maintenance, and many other aspects of gas transmission

Paul Reed

NEW ORLEANS.—Transmission problems of gas pipe-line companies, with particular emphasis on pulsation, highlighted discussions at the annual transmission and storage conference of the American Gas Association here.

Other problems, and many new developments, in the fields of compressor stations, pipe-line construction and maintenance, communications, underground storage, dehydration, dispatching for transmission lines, and natural-gas production also were given attention in a series of luncheon conferences.

This annual operating meeting has grown increasingly important as natural gas has accounted for an ever-increasing share of the nation's total energy consumption. The 465 paid registrants at this year's meeting were told, for example, that their product, which represented only 4.4 per cent of total mineral energy consumed in 1920, had increased its share in the market to 21.1 per cent in 1951 and that during each of the past 5 years gas consumption has increased at a rate which exceeds consumption of the previous year by an average of 11 per cent.

Compressors . . . Some engine manufacturers today are quoting fuel consumption of 7 to 8 cu. ft. per horsepower-hour, Rex V. Campbell, Michigan Wisconsin Pipe Line Co., Detroit, said.

A few years ago 12 cu. ft. per horsepower-hour was considered economical on a 2 to 5-cent gas.

Improvements in piston rings of compressor units have increased horsepower-hours per gallon from 1,500 to 3,500 and some have gone as high as 6,000. With this low consumption, less sludge accumulates in the crankcase and the cost of maintenance goes down.

In the overhauling of compressor units, Campbell said, impact wrenches are making it possible to remove cylinder heads, pistons, and parts from engines in one-tenth the time taken for manual operations. Hand-made tools have been extensively supplanted by purchased tools. However, there is still difficulty in getting enough of the right kind.

As gas pressures go higher, automatic shutdowns have been widely installed at new stations. These automatic devices close the suction and discharge valves as well as shut down the engine.

With present design of gas turbines fuel consumption is 10.2 cu. ft. per brake horsepower-hour according to rated output of General Electric Co., Joseph Quill, of General Electric, said at the meeting.

By improved design, it is expected that fuel consumption will be reduced to 9.3 cu. ft. per brake horsepower-hour, which is regarded as about the same as that prevailing for reciprocating units, he said. The successful operation of the gas-turbine-driven centrifugal units at United Gas Pipe Line Co.'s Napoleonville, La., station is considered by Quill as significant for the extension of centrifugals to widespread application for adjustable speed operations on pipe lines.

The 38 General Electric gas-turbine units in gas pipe-line service include: El Paso Natural Gas Co., 28; Southern Counties Gas Co., 2; Northern Natural Gas Co., 6; United Gas Pipe Line Co., 1; and Atlantic Seaboard Corp., 1.

In Lake Maracaibo, Creole Petroleum Corp. is installing 10 G.E. gas-turbine centrifugal units for handling 130,000,000 cu. ft. daily at pressures from 20 to 1,950 psi.

Pulsation . . . Of the many detrimental effects of pulsation, the most serious is the effect on the readings of flow-measuring devices, Eric J. Lindahl, professor of mechanical engineering, University of Wyoming, told the meeting. He pointed out that such readings may be rendered absolutely invalid when meters are subjected to pulsating flow. He cited an example of an indicated meter error of 7.7 per cent where the actual error may run several hundred per cent.

At present, no general rule seems to exist for determining just how much capacity or how much resistance should be introduced to suppress pulsation to the extent that it is no longer harmful.

Research should be carried out to check the validity of propounded theory, said Lindahl. Use of the Strouhal number has been suggested, relating orifice diameter, pulsation frequency, and flow velocity to determine if and when a meter is subjected to excessive pulsation. Data obtained by a pulsameter and calculated from the flow system might be substituted into the Strouhal number to determine whether serious pulsation exists.

Line construction . . . No serious construction equipment limitations are anticipated by G. Austin Manuel, Williams-Austin Co., Pittsburgh, in the laying of large-diameter lines.

The difficulties of coating and wrapping big-inch pipe in the rough country of Pennsylvania, New York, and West Virginia are resulting in very high construction costs. This is because paint must be applied by hand on steep hillsides.

Precoating has not been practicable, he said, because of damage to the coating in bending. Furthermore, new developments are sought in equipment for laying pipe lines in metropolitan areas which would be advantageous for contractors bidding on work of a kind which is commonly handled by company crews.

To find minute cracks in longitudinal pipe welds which cannot be detected by visual inspection, extra inspection of a nondestructive type is being applied by the painting of end welds with dye and the use of X-ray, said N. F. Blundell, Gulf Interstate Gas Co., Houston. His company has its own inspectors at concrete-coating plants and at shops making engines, pressure vessels, vibration dampeners, and meter runs.

Fast construction progress in the field requires an additional welding inspector who stays with the lowering-in crew. On the Gulf Interstate project, progress has frequently been at the rate of 8,000 to 11,000 ft. of 30-in. per day under conditions of good weather and terrain.

An inspection crew for Gulf Interstate in dry overland areas consists of a chief inspector and five other inspectors. In addition, with each spread there is an engineer or party chief who has a two-man survey crew to resurvey ahead and to make a final survey after the spread. There is also a material clerk and a radiographic weld inspection unit.

Cash rewards for contractor's men have been effective in spotting pipe defects such as laminations and cracked welds.

To prevent pipe-line ruptures it is important, he said, that inspectors make certain that:

. . . **Scratches and gouges** are eliminated.

. . . **Welding of braces** on the line are carefully designed and kept to a minimum.

. . . Care is given to design of kick blocks and side connections.

Line maintenance . . . The water and detergent method of internal cleaning of gas lines has proved to be most economical, according to Clinton McClure, El Paso Natural Gas Co. By this method flow efficiency can be obtained within 2 per cent of that of new pipe.

Presence of iron sulfide in most gas lines will cause fire during cleaning by the dry pigging method. Water pigging eliminates this danger. The water and detergent method removes amine coating found within 100 miles of gas treating plants as well as oil, iron sulfide, mill scale, and dirt.

Squeegee or swab-type pigs with four cups for each 250 ft. of water wall contact should be placed behind the brush type pig, McClure said. For 500 ft. of water wall contact, the pig requirements are as follows: Exploratory run—one wear compensating pig; detergent run—two wear compensating pigs and one squeegee pig; rinse run—one wear compensating pig and two squeegee pigs. With the proper number of squeegees, the water left in the pipe will not be detrimental. Tests with ammonia displacement show that not more than 2 gal. of water has been left in pipe after cleaning.

Cost of cleaning is from $346 per mile for 30-in. to $70 per mile for 6-in. It is affected by availability of water.

For minimizing pipe-line breaks, D. C. Palm, Natural Gas Pipeline Co. of America, Chicago, recommended elimination of couplings and effective corrosion protection, design, inspection, and maintenance.

In maintenance of pipe lines and in the routine operations of extensions and replacements, attention was directed in discussions to the advantages achieved by pipe-line companies through ownership of ample supply of large construction units for handling ditching, welding, and coating.

Interconnections . . . Interconnections between gas pipe lines are most desirable for public and private interests, said Carl T. Kallina, chief of division of gas certificates of the Federal Power Commission, Washington, D. C.

The commission favors interconnections for conditions beyond those of strict emergency in a limited sense which would imply unforeseen circumstances requiring immediate action, such as a line break or other physical failure. Emergency measures also imply taking advantage of unforeseen economic benefits. Of most importance, such provisions should be part of a general plan of cooperation for meeting situations involving expected but extraordinary circumstances.

In some situations only one of two adjacent lines in a locality may physically deliver gas to the other but the return of gas may be more practicable at another location. One specific example involves a series of interconnections between two companies where emergency deliveries at the eastern end are returned in the southwestern producing area to the advantage of both. Furthermore, deliveries need not be made directly between physical connections.

Engineers on A.G.A. Program

GAS-DEHYDRATION conferences dealt largely with prevention of hydrate formation in transmission lines and design of modern solid-desiccant and glycol-dehydration plants. Pictured here are Ovid Baker, Magnolia Petroleum Corp., Dallas, moderator; Laurence S. Reid, University of Oklahoma, Norman, Okla.; Fred Zapffe, Lone Star Gas Co., Dallas; E. A. Koenig, Wilcox Trend Gathering System, Inc., Dallas; J. H. Echterhoff, United Gas Pipe Line Co., Shreveport.

COMMUNICATIONS was the subject of one conference, which dealt with maintenance of mobile radio units, telephone service, and microwave systems for pipe lines. Speakers here are, left to right, J. W. Flint, Cities Service Gas Co., Wichita; J. E. Keller, Dow, Lohnes and Albertson, Washington, D. C.; H. A. Rhodes, Transcontinental Gas Pipe Line Corp., Houston; T. G. Humphreys, Jr., Alabama Gas Corp., Birmingham, and L. I. Duthie, El Paso Natural Gas Co., El Paso.

DISPATCHING CONFERENCE was largely concerned with preparations for a manual on practices for dispatchers of natural-gas pipe lines. Attention was given to the effect of weather on transmission loads, procurement of weather information, and telemetering and remote-control problems. Left to right are W. F. Crutchley, Consolidated Natural Gas Co., Clarksburg, W. Va.; T. B. Kelly, Texas Eastern Transmission Corp., Shreveport, chairman; and S. A. Chadwell, Columbia Gas System Service, Charleston, W. Va., vice chairman.

Third, fourth, and even fifth parties can exchange by so-called displacement. Prior planning has to be made to facilitate such emergency operations.

Thought should be given to staggered installations by which one system installs capacity one year and another the next so that during the 2 or 3-year period when loads are being developed, particularly in new areas, higher utilization and less expenditure on the combined operations may be possible.

Communications . . . Since 1950 the microwave communication systems of natural-gas pipe lines have grown from nothing to a total of 14,584 system miles of 22 companies, representing an investment of over $17,000,000.

Pipe-line companies were advised by Joseph E. Keller, Dow, Lohnes and Albertson, attorney for Committee on Radio Facilities, American Petroleum Institute, to continue operating their microwave systems independently. He warned of the danger which might be faced in the future if the pipe lines would go to common carrier communication and lose the advantages won by the establishment of private facilities.

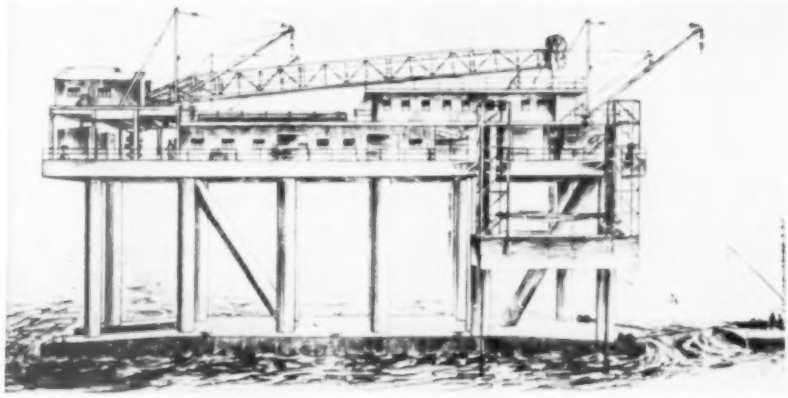
Conference Speakers at A.G.A. Meeting

PIPE-LINE CONFERENCES dealt with equipment requirements for construction, operation, and maintenance, plus inspection, welding practices on high-pressure lines, proof-testing after installation, right-of-way maintenance, and internal cleaning. Some of the participants were, left to right, Dan Williamson, Transcontinental Gas Pipe Line Corp., Houston; G. Austin Manuel, Williams-Austin Co., Pittsburgh; J. W. Hall, Houston, formerly with Transcontinental Gas Pipe Line Corp., chairman; A. J. Shoup, Texas Eastern Transmission Corp., vice chairman; Norman F. Blundell, Gulf Interstate Gas Co., Houston, and F. A. Hough, Southern Counties Gas Co., Los Angeles.

COMPRESSOR-STATION conferences included discussions on pulsation on lines operating with reciprocating compressors, and surges on lines with centrifugal compressors. Speakers here included, left to right, Newell C. Comfort, Hope Natural Gas Co., Clarksburg, W. Va., vice chairman; J. G. Barnhart, Natural Gas Pipeline Co. of America, Chicago; Rex V. Campbell, Michigan Wisconsin Pipe Line Co., chairman; Edward Henderson, Arkansas Louisiana Gas Co., Shreveport; Glenn Damewood, El Paso Natural Gas Co., El Paso, and Ned H. Moerke, Fluor Corp., Ltd., Los Angeles.

OTHER COMPRESSOR-STATION discussions included such subjects as water treatment and water disposal, costs and fuel consumption of gas-turbine units, preventive maintenance at stations, and the use of gas cleaners. Shown here are Robert Jeffries, New York State Natural Gas Corp., Pittsburgh; Conrad Marvin, Texas Eastern Transmission Corp., Shreveport; Newell C. Comfort, Hope Natural Gas Co., Clarksburg, W. Va., vice chairman; L. M. Gibson, Mississippi River Fuel Corp., St. Louis; S. A. Bradfield, Southern California Gas Co., San Gabriel, Calif., and E. M. Rowland, Cities Service Gas Co., Oklahoma City.

GULF COAST



Drilling firm building . . .

New Submersible Barge

William P. Sterne

HOUSTON.—A new contract-drilling company has been organized which will utilize a new submersible barge for exclusive work in the Gulf of Mexico tidelands.

The firm, American Tidelands, Inc., now has under construction at Alexander Shipyards, Inc., in New Orleans a portable drilling barge which can drill wells in water up to 45 ft. deep. Delivery is expected some time in December, and operations will get under way shortly thereafter. Company offices are in Houston and New Orleans.

This is the second such company organized solely for contract drilling in the Gulf of Mexico tidelands. The other is Ocean Drilling & Exploration Co. (Odeco) of New Orleans *(The Oil and Gas Journal, February 8, 1954, page 96).*

Officers . . . American Tidelands, Inc., is headed by Thomas L. Jordan, of New Orleans, president. He is an independent oil operator and has been prominent in marine operations. Spencer F. Rowan, New Orleans, is vice president and general manager. Rowan, one of the designers of the new barge, served for 10 years as assistant to the superintendent of drilling and production in the Gulf Coast area for The Texas Co. John B. Carter, Jr., Houston, is vice president. He is a director of Thomas Jordan, Inc., and an independent operator. Edmund H. Crane of New Orleans is secretary-treasurer of the new company. He holds this same post and a directorship in Thomas Jordan, Inc., and is also a partner in Thomas Jordan & Co.

Directors of American Tidelands include Perry R. Bass, Fort Worth, a partner in Richardson & Bass and a vice president and director of Sid W. Richardson, Inc.; J. Edwin Hill, Fort Worth, vice president and director of Sid W. Richardson, Inc., and a partner of Perry R. Bass; Jack Frost, Dallas, director of Three States Natural Gas Co., chairman of the board of Featherlite Corp. and president of Frost Oil Co.; Harry B. Jordan, New Orleans, brother of Thomas L. Jordan and vice president and director of Thomas Jordan, Inc.; and Leslie Durant, New Orleans, vice president and general manager and director of Alexander Shipyard, Inc. Durant designed the barge with Rowan.

Unusual barge . . . Negotiations are under way for actual contracting of the barge when delivery is made on the unit.

The barge will be 200 ft. long, 74 ft. wide, and 12 ft. deep. A 2,000-hp. diesel-electric drilling rig will be mounted on the barge. The entire barge, with all equipment installed, will be self-contained and will be moved by tugs as one unit. *(See drawing).*

As a self-contained unit, the barge will have complete living quarters for a crew of 40 and all machinery, equipment, and provisions necessary in drilling offshore wells.

Stabilizing pontoons . . . The design of this barge is similar to Ocean Drilling & Exploration Co.'s barge, with the exception that no drilling equipment will be contained in the lower hull, or pontoon section. Like the Odeco barge, it is being built under the old Hayward-type barge patents.

When the barge arrives at location, it will be lowered to bottom by means of auxiliary stabilizing pontoons, one end at a time. In its final position on bottom, the barge hull and stabilizing pontoons will be completely ballasted, leaving the elevated platform, containing all working parts and living quarters, supported on 12 steel columns, each 6 ft. in diameter. The elevated platform will remain above water at a height where it is estimated waves will be "unable to reach." Design calls for the barge withstanding 100-m.p.h. winds and force of waves produced by such winds.

On completing a successful producer, a caisson and platform will be built for handling production before the barge leaves.

The barge has a low center of gravity sufficient to prevent its capsizing when floating to location. This in spite of the fact that all heavy machinery is located on the upper deck section. The mast, like that of the Odeco barge, is collapsible.

ROCKY MOUNTAIN

Test Promising

Mission Canyon production indicated in Brorson area

DENVER.—Sun Oil Co. and Phillips Petroleum Co. have recovered 360 ft. of free oil on a drill-stem test of the lower Mission Canyon at their Brorson area test in Richland County, Montana.

Mission Canyon shows were also found in the area discovery well drilled last year by the two companies ¾ mile to the southeast, but the well was completed in the Ordovician from 12,585-12,605 ft. It is Montana's deepest hole and deepest producer.

To the southeast 6½ miles, Sun-Eramont et al are fishing at their 1 Beagle

Land & Livestock Co., another possible Mission Canyon discovery in the North Sidney area.

The Brorson area discovery was the Williston basin's most outstanding development of 1953. Its importance lies in the fact it is located in the central, deep portion of the basin and was the first basin success drilled on a seismic prospect away from known surface features.

Case Clouds Titles

Court ruling creates doubt in Dakota farms' ownership

WILLISTON, N. D.—Ownership of more than 700 North Dakota farms is in doubt following a decision in Williams County District Court last week. Most of the land is under oil and gas lease, with hundreds of thousands of acres involved. The decision will be appealed to the North Dakota Supreme Court.

The decision held that Lars Kvam does not own 150 acres in the heart of Beaver Lodge oil field on which Amerada Petroleum Corp. has an oil lease. The tract has not been drilled but is offset by the deepest well in the Williston basin, drilled by Amerada on an adjoining tract owned by Kvam.

Kvam's title and right to make a mineral lease were contested by the State of North Dakota and Carter Oil Co. to whom the state had given a lease to half the mineral rights.

Roots of the case go back to the drouth and depression days, when farmers were permitted to borrow money from state agencies. When they defaulted the state acquired title to the lands, but subsequent legislatures sought to give original landowners first chance to repurchase. One statute reserved to the state 50 per cent of mineral rights of all land sold. Another statute gave purchase preference to foreclosed owners, and an attorney general's opinion held that the mineral reservation did not apply to such preferred purchases.

The tract in question was owned by Ernest Bylin, foreclosed by the Board of University and School Lands, repurchased by Bylin after the depression, and then sold to Kvam who leased to Amerada. However, the board disregarded the attorney general's opinion, claimed half the mineral rights, and leased them to Carter. Carter and the board brought a quiet-title suit.

The court ruled that the preference statute was unconstitutional, held Bylin's title invalid, and ordered repayment to Kvam of his purchase price, thus returning full ownership of the tract to the state.

CANADA

Big Gas Line Near

Contract for huge Trans Canada line expected to be let within 6 weeks; no delay expected on Canadian permit

DALLAS.—Engineering contract for the huge Trans Canada Pipe Lines, Ltd., natural-gas trunk line from the Alberta gas area to eastern Canada markets is expected by company officials to be let by the last of April or first of May.

Trans Canada, the newly amalgamated combine of Western Pipe Lines, Ltd., and the old Murchison-backed Trans Canada, expects to go before the Alberta Petroleum and Natural Gas Conservation Board in the near future for a permit to export gas from the province.

The company expects no delay, Frank A. Schultz, vice president of the amalgamated firm, said here last week, because all provincial requirements as set forth by Premier E. C. Manning have been met by the merger.

As soon as the provincial export permit is issued, Schultz said, Trans Canada will go to the Federal Board of Transport Commissioners in Ottawa for clearance on the project. No difficulty is expected there either.

Permits from both provincial and federal authorities should be in hand by the middle or latter part of April, Schultz said.

Some phases in doubt . . . The big gas trunk line, as now planned, would extend from Princess, Alta., near the Saskatchewan border, through Regina, Sask., Winnipeg, and Kenora, Port Arthur, Fort Williams, and Sudbury, Ont., to Toronto. It would branch at Toronto, with one line dipping into southwestern Ontario, and a larger line connecting Ottawa and Montreal.

The future of a branch line planned from Winnipeg to the Minneapolis area of the United States is as yet uncertain, Schultz said. The company will know more definitely whether the line will be built after the hearing on the entire project by the Board of Transport Commissioners. Construction of this portion of the line also would require approval of the U. S. Federal Power Commission.

If the branch materializes, it would be built and operated south of the United States-Manitoba border by the Minnesota Utility Co., which would buy the gas from Trans Canada.

Another big question mark, whether the line will be 30-in. or of larger diameter, also will not be definitely decided until after the meeting with the commissioners.

However, Schultz said, the company's investigations so far have just about ruled out use of 36-in. pipe. The line probably will be 30-in., or possibly 34-in. from Alberta to Winnipeg and 30-in. the rest of the way.

It is also anticipated, he said, that some form of agreement will be reached at the commissioners' hearing on the question of the government's granting the company tax and duty concessions during the first few lean years of operation.

The organization . . . The new Trans Canada is headed as president by N. E. Tanner, formerly Alberta minister of lands and minerals. Tanner resigned as president of Merrill Petroleum, Ltd., to take the position but will remain as chairman of the board of Merrill.

In addition to Schultz, representing the Murchison interests, H. R. Milner, Edmonton, and head of the former Western Pipe Lines, also was elected a vice president. An executive vice president with substantial experience as an executive with a major transmission company will be named soon, Schultz said.

Trans Canada operations will be conducted under a 12-man board of directors and management committee, including as members Tanner, C. W. Murchison, Milner, Schultz, and Alan H. Williamson of Western. The new firm was organized as a 50-50 venture of the two originally competing firms.

Oil Income Up

Alberta's 1953 oil revenue estimated at $90,000,000

EDMONTON, Alta. — About one-third of the income to the Alberta Government from oil and gas development since the Leduc oil discovery in February 1947 was received during the fiscal year ending March 31.

Premier E. C. Manning, in this year's budget address, reported the government has received $271,955,853 from oil and gas development from February 1947 through January 31, 1954. He estimated oil and gas revenues for the

fiscal year ending March 31 will exceed $90,000,000.

Manning said oil production during the past year in Alberta amounted to 76,818,432 bbl., valued at $193,118,494, an increase of 17,909,710 bbl. and of $54,460,579 in valuation over 1952.

Cardium find . . . He said the highlight of the year was the discovery of Cardium sand oil production in the Pembina region, about 65 miles southwest of Edmonton. He said many experts believe this will become Canada's greatest oil field.

Speaking on his government's stand favoring gas export, Manning said, "We may anticipate a program of gas exploration, development, processing, and industrialization that may equal or exceed the development of our vast oil resources."

He pointed out that gas containing chemical byproducts must be processed locally before it is piped out of the province. He said gas processing plants and petrochemical industries to use the chemical byproducts offer the greatest industrial potentialities.

Alberta Allowable Reduced

WINNIPEG, Man.—The Petroleum and Natural Gas Conservation Board has cut the March daily production allowable for Alberta to 184,594 bbl. daily, a reduction of 77,591 bbl. daily from the February allowables.

The reduction bore out the forecast of a cut indicated in nominations by refiners for 181,131 bbl. daily from fields on economic allowable. Last December, Alberta producers estimated daily average production of 252,000 bbl. for the first quarter of 1954, but with the reduction it appears that the average for the quarter will run between 225,000 to 230,000 bbl. daily.

The allowable reduction reflected the annual shutdown and turn-around of Imperial Oil, Ltd.'s, Sarnia refinery and two or three other western Canada refineries and a surplus of stocks due to the extremely mild weather.

Kenwell Sale Approved

TORONTO, Ont.—Stockholders of Kenwell Oils & Mines, Ltd., have approved acquisition of the company by Sapphire Petroleums.

The transaction is subject to the approval of the two stock exchanges on which the stock of both companies is traded and various governing bodies.

One share of Sapphire stock will be traded for each share of Kenwell stock. Sapphire recently was authorized to increase its capitalization from 3,500,000 to 7,500,000 shares, with 2,025,266 of the additional shares effecting the acquisition of Kenwell *(The Oil and Gas Journal, March 1, page 43)*.

The Kenwell acquisition will increase Sapphire's recoverable oil reserves, exclusive of secondary-recovery reserves, from 5,500,000 bbl. to nearly 8,368,000 bbl. Sapphire's interest in a 350,000-acre tract covering part of the Athabaska oil sands of northeastern Alberta also would be increased from 10 to 13¾ per cent.

The transaction will give Sapphire interest in 65 producing oil wells and nine producing gas wells in Canada and the United States.

Glacier Overlooks Rugged Exploratory Area

PICTURESQUE Jasper glacier lies at the western edge of an area of rugged Rocky Mountain foothills near Jasper, Alta., and along the British Columbia line where Sun Oil Co. and Royalite Oil Co., Ltd., have jointly undertaken an exploratory venture covering more than 1,300,000 acres of government reservations.

Sun has been conducting geological surveys for the past two summers in a belt of foothills 108 miles long and 40 miles wide on the Rockies' eastern slopes. The company is currently shooting reconnaissance lines over the area using portable seismograph equipment. Recording crews pack all instruments on their backs.

Geology in the area is extremely complex with numerous folds and faults. In the western portion of the area it is not uncommon to encounter an elevation change of more than 800 ft. in half a mile. Drilling crews have to move track-mounted drills over the area with the aid of tractors. Supplies reach the men by pack horse. There have been cases where equipment has had to winch itself downhill, and on some occasions bulldozers have sunk almost out of sight in the muskeg.

Sun figures it can conservatively say the exploratory operation will cost five times as much as a seismic prospect on the plains.

MID-CONTINENT

Phillips Has New Gasoline

BARTLESVILLE, Okla. — Phillips Petroleum Co. has begun marketing a new premium-quality automobile gasoline containing di-isopropyl, an ingredient made exclusively by Phillips.

Di-isopropyl, which upgrades octane rating of gasolines, previously had been used by Phillips only in high-octane aviation fuels. Lifting of government restrictions has permitted the company to use it, as well as HF aviation alkylate, in the new automobile gasoline.

Phillips claims the new gasoline combines increased power, a clean-burning fuel requiring none of the special additives.

Gas Growth Outlined

Interstate movement up from 636 to 3,200 billion cubic feet a year since start of FPC regulation, report shows

WASHINGTON.—Additions to natural-gas reserves each year still exceed annual consumption, but the percentage gain in consumption is consistently greater than the percentage increase in reserves, it is shown in the Federal Power Commission annual report released last week.

Eleven years of certificate regulation by the FPC has seen the interstate movement of natural gas increase from 636 billion to more than 3,200 billion cubic feet a year.

Since federal regulation was instituted in February 1942, the commission has issued over 1,000 certificates for the construction of 53,000 miles of pipe line and 3,883,000 compressor horsepower at a total estimated cost of $3,888,038,000. At the close of fiscal 1953 there were 108 applications pending for the construction of 9,700 miles of line and 255,400 compressor horsepower involving a total estimated cost of $554,409,000.

During last year, the commission noted, applications for substantial increases in delivery capacities accounted for a major portion of natural-gas certificates. Also, it was pointed out, estimated proved recoverable natural-gas reserves increased by only 5.9 trillion cubic feet during the calendar year 1952 while net production for the year was 8.6 trillion cubic feet.

"This indicates a life of known recoverable reserves of 23.2 years at the end of 1952 as compared with an indicated life of 24.5 years at the end of 1951 and 27 years at the end of 1950," the commission commented. "Expansion of the natural-gas industry is, it appears, having a noticeable effect on the life index of proved recoverable natural-gas reserves."

During the year authorizations were granted for increases in system capacity of 405,000 M.c.f. daily by El Paso Natural Gas Co., 200,000 M.c.f. by Northern Natural Gas Co., 152,000 M.c.f. by Pacific Gas & Electric Co., 350,000 M.c.f. by Southern Natural Gas Co., 295,000 M.c.f. by Texas Gas Transmission Co., 130,000 M.c.f. by Texas-Illinois Natural Gas Pipeline Co., and 100,000 M.c.f. by United Gas Pipe Line Co. Certificates for new lines were granted to the Gulf Interstate Gas Co. for 375,000 M.c.f. daily capacity, Permian Basin Pipeline Co. for 300,000 M.c.f., Southern California Gas Co. and Southern Counties Gas for 152,000 M.c.f., and Wilcox Trend Gathering System, Inc., for 125,000 M.c.f.

CAPACITY OF MAJOR TRANSMISSION COMPANIES

	M.c.f. dly.*
Arkansas Louisiana Gas Co.	775,000
Cities Service Gas Co.	1,082,000
Colorado Interstate Gas Co.	†509,000
El Paso Natural Gas Co.	1,910,000
Gulf Interstate Gas Co.	375,000
Kansas-Nebraska Natural Gas Co., Inc.	193,000
Michigan-Wisconsin Pipe Line Co.	303,000
Mississippi River Fuel Corp.	450,000
Natural Gas Pipeline Co. of America	523,000
Northern Natural Gas Co.	‡1,110,000
Panhandle Eastern Pipe Line Co.	§850,000
Southern Natural Gas Co.	1,020,000
Tennessee Gas Transmission Co.	1,617,000
Texas Eastern Transmission Corp.	1,219,000
Texas Gas Transmission Corp.	977,000
Texas-Illinois Natural Gas Pipeline Co.	504,000
Transcontinental Gas Pipe Line Corp.	555,000
Trunkline Gas Co.	¶250,000
United Gas Pipe Line Co.	4,181,000

*Since in some instances gas is handled by two or more companies, total capacities may be substantially greater than actual deliveries on a peak day.

†Has pending an application to purchase 100,000 M.c.f. per day from Pacific Northwest Pipe Line Co.

‡Has applications pending to purchase 150,000 M.c.f. per day at the Canadian border from Western Pipelines, and to construct facilities to handle 40,000 M.c.f. per day out of El Paso's Dumas station and 10,000 M.c.f. per day out of Phillips' Gray gasoline plant.

§Has indicated that with approximately 265,000 M.c.f. per day from Trunkline, actual capacity is 890,000 M.c.f.

¶Has indicated that actual operating capacity is 265,000 M.c.f. per day.

Data in the accompanying table are from certificate applications in FPC files indicating daily transmission capacities of the major pipe-line companies taking gas out of the producing fields of the Southwest, excluding gas deliveries from storage fields.

Iran Support Asked

Relief promised industry if imports are increased

WASHINGTON.—High government officials have asked the domestic oil industry to support the settlement of the Iranian dispute now being worked out in London, with an implicit understanding that if it results in an undue increase in imports the administration will do something about it.

Executives of a number of oil-trade associations were called to Washington 10 days ago to meet with Herbert Hoover, Jr., special consultant to the Secretary of State, and Secretary of the Navy Robert Anderson. Attending the meeting were Walter Hallanan of the National Petroleum Council; Frank Porter of the American Petroleum Institute; W. M. Vaughey, Independent Petroleum Association of America; R. F. Windfohr, Mid-Continent Oil and Gas Association; W. W. Flenniken, Rocky Mountain Oil and Gas Association, and M. H. Robineau, Independent Refiners Association of America.

The proposed Iranian settlement was summed up for the group by Hoover who, with Anderson, appealed for the support of the domestic industry in the interests of national security and to eliminate the possibility that Iran's oil might fall into the hands of Russia.

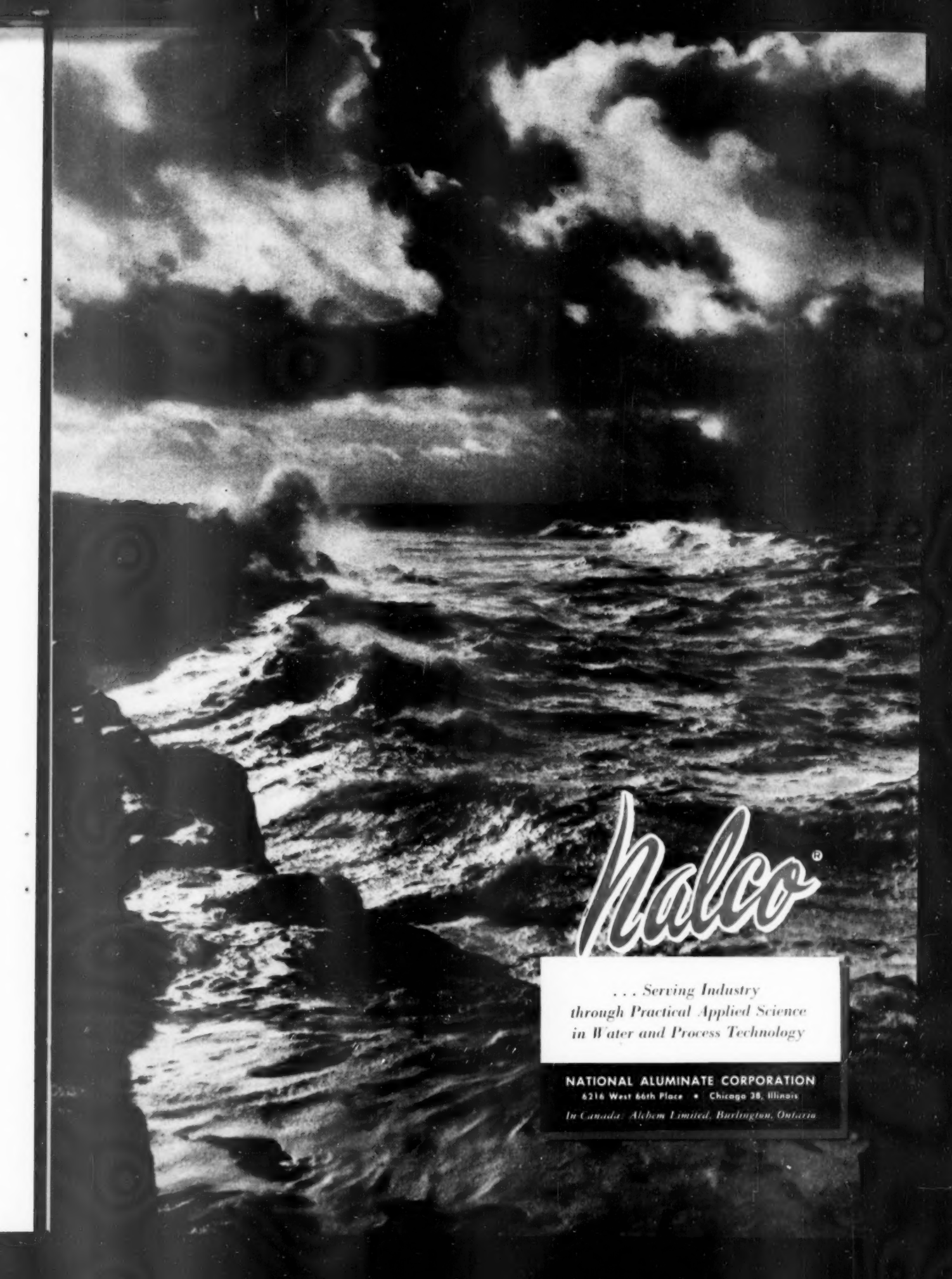
The government officials reportedly assured the industry group they would urge the companies participating in the Iranian consortium to limit imports into

Next Week: How to Handle Residuals

THE most comprehensive discussion yet put together on the "bottom of the barrel" problem will feature next week's issue of The Oil and Gas Journal—the Journal's annual Refining Number.

Seven processes designed to reduce heavy-fuel yields will open the special section, with a detailed flow sheet and process description for each. Articles will include a three-part discussion of utilization of residuals, asphalt, and coke, and six significant features on the residual problem prepared by industry experts.

In addition, the special issue will include several other articles of interest to refiners, on alkylation developments, a new method of waste disposal, and operations at the new Corpus Christi refinery of Suntide Refining Co.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the United States to minimize the impact of Iran's return to the oil market. There were indications that Hoover believes the present import level is not too high. There has been no intimation of the point at which he believes it would become so.

The meeting apparently was an outgrowth of a letter sent Secretary of State Dulles recently by the Independent Refiners Association of America. It charged the State Department had ignored the present oversupply of petroleum and its possible effects on the industry in the negotiations with Iran.

Congressional attack? . . . Meanwhile, there were indications that the import fight might flare up again in Congress in the very near future. Chairman Reed of the House ways and means committee and Rep. Richard M. Simpson of Pennsylvania, second ranking Republican member of the committee, may fight against extension of the Reciprocal Trade Agreement Act, due to expire this spring.

Termination of the act would have no effect on the reciprocal agreements now in force but would give time for the committee to write its own version of legislation permitting the President to juggle tariffs.

Simpson, who sought last year to have Congress adopt a quota system for oil imports, has the support of the whole coal industry and most of the members from the coal-producing states. The domestic oil producers have not joined the coal industry as yet, but advocates of the quota idea privately express the belief that if Middle East oil continues to be shipped into Texas, where one tanker load arrived last month, many producers will support the plan.

FPC Curb Before Senate

WASHINGTON. — Legislation revoking Federal Power Commission authority over companies engaged in the distribution of natural gas within a single state is expected to come up for consideration in the Senate before the end of the month.

The bill, introduced last year by Rep. Carl Henshaw of California, was passed by the House last July and reported almost simultaneously by the Senate commerce committee.

The measure is designed to relieve such companies as the East Ohio Gas Co., held by the Supreme Court to be subject to federal regulation, whose facilities for the transportation and sale of natural gas are located within a single state.

WATCHING WASHINGTON

Bertram F. Linz

Surface Only Scratched

New tools for industry are coming along so fast that electronics and the atom may be said to be revolutionizing industrial procedures. Scientists say the surface has just been scratched.

From the atom, industry is getting radioactive materials valuable for tracing the flow of oil underground, dividing batches of different products in pipe lines, tracing difficulties in refinery units and more recently for well logging.

Electronics have provided industrial television for remote observation of equipment, operations and workers, and now is about to bring forth a cheaper electronic computer for industrial use which apparently can do everything but walk.

The electronic computer is best known as a machine costing millions of dollars which solves in hours mathematical problems that would take centuries for a man to figure out. New machines now being readied for introduction, however, will cost as little as $50,000 and will pay for themselves quickly in savings in clerical, overhead and "bottleneck" costs, it is claimed.

These new computers can "store" hundreds of thousands of statistical items and call upon them as required for tabulations and reports. They can keep social-security and personnel records, make economic studies, prepare budgets, and even schedule plant operations for a week in 15 minutes.

Lawyers Don't Quit Easily

The Department of Justice has about given up hope that its plan to secure consent decree settlements in advance of the filing of antitrust suits would secure wide acceptance in industry.

The plan announced last year by Assistant Attorney General Stanley N. Barnes, as a quick and inexpensive way of settling civil cases has been laid before the defendants in six cases. Barnes recently admitted that in only two of them is there any indication a deal can be worked out.

It was proposed to prepare complaints for filing and then call in the defendants to ask whether they desired to prepare an answer and negotiate consent decrees based on the assumption the Government would win its case. If agreement was reached, the department would go into court with the complaint, the defendants' answer and a consent decree which the court could accept then and there, terminating the proceedings.

As an added inducement for a quick settlement, the department was prepared to offer to call off any criminal suits it contemplated or had filed in the same matter.

The idea apparently fell down when the department asked prospective defendants to admit defeat before suit was even filed. In the past the Government has accepted many consent decrees after cases have been filed or during their trial. Department officials are about convinced that industry lawyers are not willing to admit they are licked until, at least, the Government's whole case is disclosed before the courts.

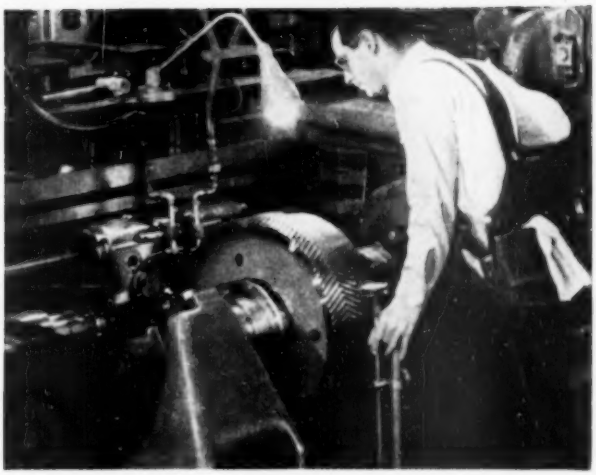
Incentive for Malone

Sen. George W. Malone of Nevada, arch-enemy of the reciprocal trade agreements particularly as applied to oil and other strategic materials, is expected to fight even more vigorously from now on for the protection of the domestic oil and mining industries.

The reason? Nevada has just become the 29th oil-producing state of the nation.

Malone is chairman of an Interior affairs subcommittee which is studying the wartime availability of minerals, materials and fuels. He is pressing hard to demonstrate that in the event of war no reliance can be placed upon oil from the Middle East.

According to reports reaching Washington, the Nevada "oil rush" resembles that for gold in the pioneering days of the state. In less than a week after the test of Shell Oil Co. in Nye County the federal land office at Reno leased some 500,000 acres of public lands. Officials estimated that between 5,000,000 and 6,000,00 acres of public land have been taken under oil and gas leases in the past 4 years and said there is very little unleased land left in the region of the Shell well.



Facts

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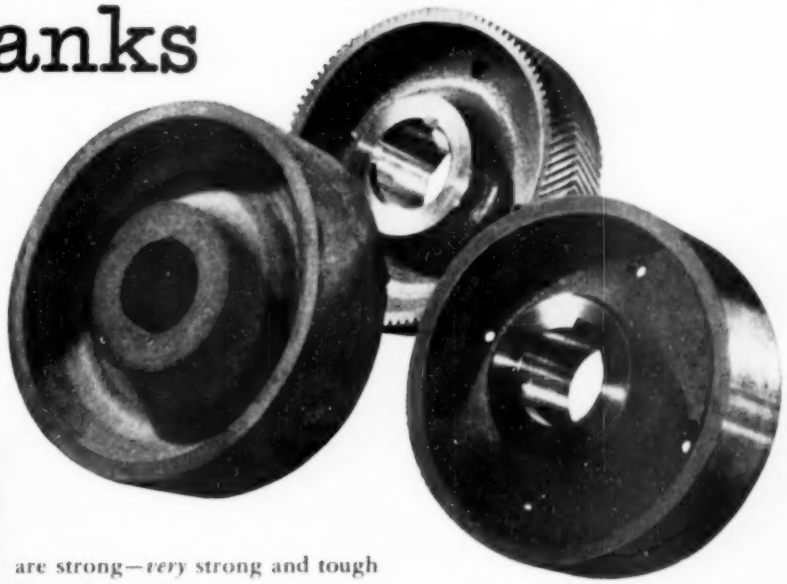

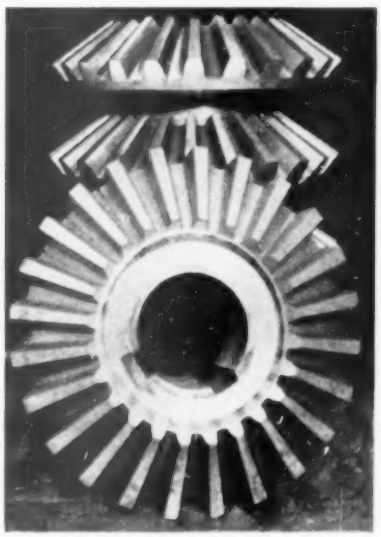

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FENCED AND MOTHBALLED, this well is one of 220 producers which give Elk Hills a productive capacity of about 130,000 bbl. daily to make it California's largest field—if it were opened.

Shut-in Field Growing

Productive capacity of closed naval reserve now exceeds Wilmington, makes Elk Hills California's largest field

LOS ANGELES.—The Elk Hills field, or as it is also known, Naval Petroleum Reserve No. 1, would probably rank as California's largest producer if it were opened today.

The preparedness program carried on by the Navy at the westside San Joaquin Valley field for the past 6 years has resulted in Elk Hills' productive capacity being increased to about 130,000 bbl. daily. Wilmington, which for the past decade has held the No. 1 spot, has dropped to less than 120,000 bbl. daily and is continuing to decline from month to month.

Currently Elk Hills is producing about 23,000 bbl. daily, an increase of 14,000 bbl. over a year ago. All of the gain is from shallow wells, and is the result of a program designed to prevent water migrating up-structure and trapping substantial quantities of crude.

Only oil being produced from the deeper Stevens zone wells is that resulting from the completion tests of new wells and periodic tests of older wells. Of the 220 Stevens producers completed only 3 were on production at the close of World War II. The remainder have been completed since then, and aside from short-time tests have never been produced. Thus while the actual rate at which the Stevens can be efficiently produced is unknown, current estimates place the level at approximately 65,000 bbl.

Drilling slow-down . . . Because development of the Stevens zone has reached the point where all pools are being drained, further drilling is being suspended after July 1. About three rigs will be kept at work on shallow drilling for the time being. By the year's end, however, it is anticipated the only activity will be that in connection with curbing water migration in the shallow zone.

Status of Stevens development is that over most of the structure the sand pay has been drilled to a density of about 1 well per 40 acres. In the areas where the zone is a shale, development is down to 1 well per 80 acres. About 200 more wells would be required to complete a 40-acre zonal spacing but this development will not be undertaken at this time.

One of the Stevens sands is thought to be among the thickest encountered in any California fields. Over an area of approximately 1,200 acres its average thickness is about 1,200 ft. At some well sites twin producers have been completed, one taking in the bottom 600 ft. of sand and the other the upper half section.

While the Navy Department has carried out its obligation of having a readily available oil reserve for times of national emergency, one problem still must be solved. Existing pipe-line facilities out of the valley are not sufficient to transport the additional 125,000 to 150,000 bbl. daily which Elk Hills could produce.

Accordingly the Navy is reportedly attempting to secure approval of the Senate and House armed services committees to construct a 125-mile 14-in. line to the Los Angeles refining center. Such a line probably would not be designed to handle the field's entire output; only that for which there probably would be no outlet if all other lines were operating at full capacity.

Fishing Job Continued

BAKERSFIELD Calif. — Ohio Oil Co. continued fishing operations in the world's deepest well in Paloma field near here after having washed over drill pipe to 15,906 ft., leaving about 5,500 ft. of pipe to be recovered before the drilled depth of 21,482 ft. is reached.

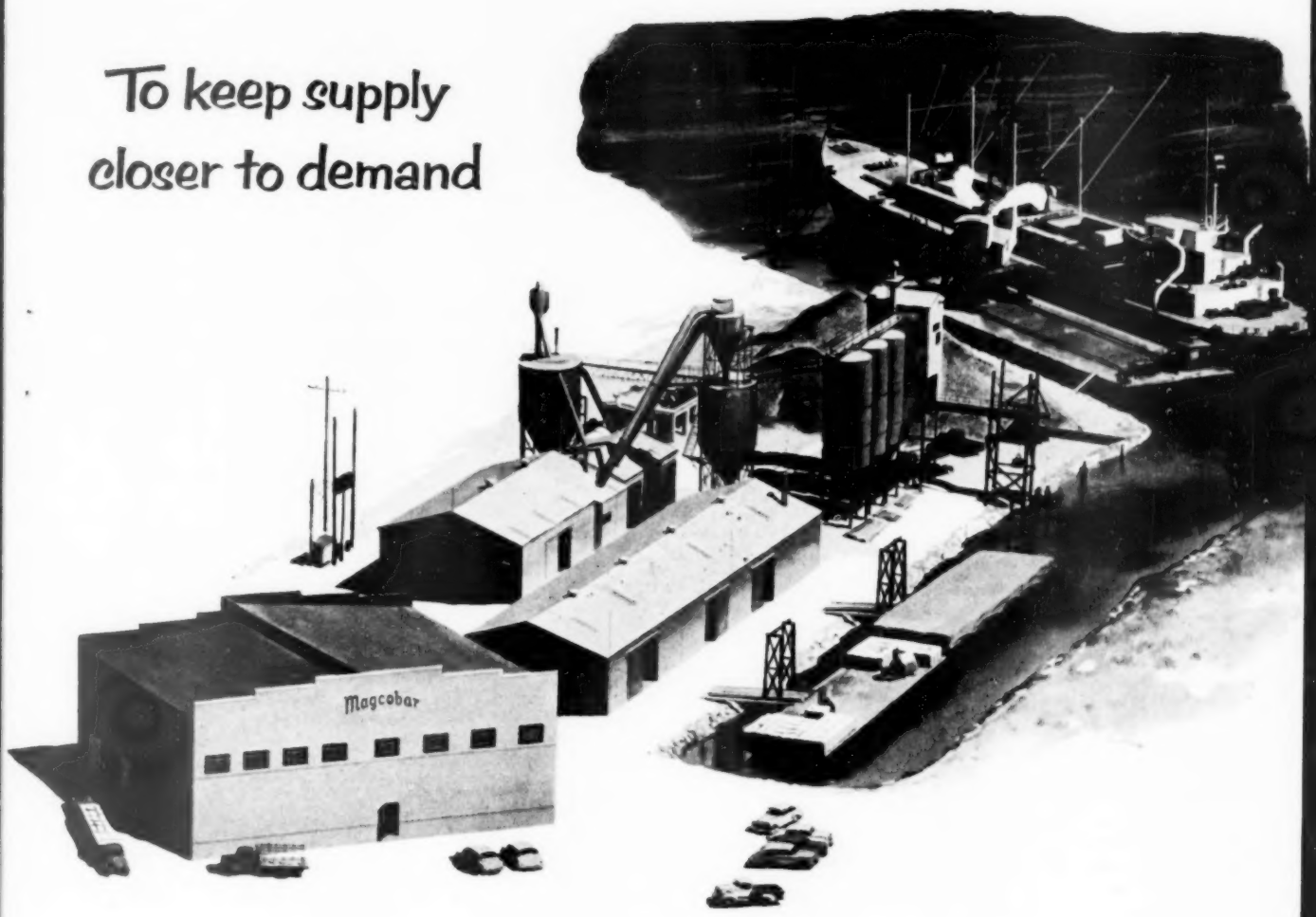
Some of the 5,000 ft. of pipe recovered to date was found to be free and had only to be pulled from the hole, but that is becoming less frequent. However, more and more of the job is becoming solely a washing-over operation.

Offer Made for Fullerton

LOS ANGELES.—Fullerton Oil Co. announced it has received an offer from unidentified eastern interests for the purchase of its stock for about $70 per share in a deal which could involve $51,000,000.

The purchase offer is conditioned on acceptance by at least 80 per cent of the stock. Fullerton produces and sells crude oil and natural gas in California, Texas, New Mexico, Wyoming, and Oklahoma, and had net crude production during 1953 of 2,071,644 bbl.

To keep supply closer to demand



Magcobar has opened a new Barite plant at New Orleans

Located on the Industrial Canal at New Orleans, this new Magcobar barite plant is strategically located to draw raw materials from throughout the entire world to meet future needs of the drilling industry. Close to Gulf Coast drilling activity on land and offshore, this new plant will enable Magcobar to supply highest quality barite to the industry at minimum transportation costs. This plant is another step by Magcobar in supplying the oil industry with highest quality drilling mud at the lowest possible cost. When you need mud, call your Magcobar Dealer. There are more than 400 in the United States and Canada.

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Plea for Conservation

Richfield chief tells producers California's voluntary law breaks down when needed, causes waste of resources

D. H. Stormont

BAKERSFIELD.—Chief trouble with California's oil-conservation program is that, being voluntary, it always breaks down whenever conditions put a severe strain on it—or just when the industry most needs it.

This observation was made by C. S. Jones, president of Richfield Oil Corp., before the San Joaquin Valley Oil Producers Association at its annual meeting here March 11. Last week also was California Conservation Week, so proclaimed by the governor for the promotion of conservation of all natural resources.

To illustrate that (1) overproduction of oil results in waste and (2) during such periods a voluntary conservation program is not adequate, Jones recounted the industry's struggles from 1921 through 1938 . . . an era of "overproduction, excess stocks, emergencies, crises, and sometimes ruinously low prices."

It was touched off by the discovery and rapid development of three town-lot fields, Huntington Beach, Signal Hill, and Santa Fe Springs. Several times the situation was brought under control through voluntary curtailment programs. But, as he pointed out, these had a habit of falling apart when put to a real test . . . as for example in 1927 when Ventura Avenue began to produce large volumes of crude and then in 1938 when Wilmington's output passed the 100,000-bbl. daily mark.

"By the end of 1923, total petroleum stocks amounted to 113,550,000 bbl. That was the lowest inventory the industry was to have until the end of World War II. Large stocks of petroleum constituted a millstone around the neck of the petroleum industry, weighing prices down to depressed levels throughout the whole period . . .

"If, since 1921, we had produced our oil under sound conservation practices, our present productive capacity would be much greater, our readily producible reserves would be much larger, and in all probability we would have collected several billion dollars more for the oil which we have sold."

The real villain . . . Basic cause of overproduction, "the arch enemy of wise conservation methods in the production of oil—the real villain," Jones declared is the so-called "law of capture."

This, he said, is because "the oil producer is not free, in the absence of an agreement with other producers or regulations by the states, to produce what he himself chooses to produce. He must either produce as fast as his neighbor or lose his oil to another."

While the oil producer has the right to protection for his property, in the form of proper oil conservation laws, Jones believes he has a corresponding responsibility to the state and nation. That, he said, was the duty of not wasting a single barrel of oil—of not leaving in the ground oil which is recoverable by any economic means.

Role of imports . . . In the balancing of rights and duties of an oil man, Jones declared, it is "the right of every American oil producer to be protected from excessive imports of foreign oil."

Admitting that excessive imports could harm the West Coast industry, he was not fearful such would be the case over any lengthy period of time. His reasons were (1) the area's continued increase in population and demand, and (2) confidence in the importing companys' business statesmanship and wisdom. If it proved otherwise, the matter should be dealt with directly and on its own merits by the federal Government, he added.

"It would be utter folly to defend against excessive imports in any other way. Certainly it does not seem wise to say that because of imports we should shy away from sound conservation laws."

Imports of natural gas from other states was regarded by Jones as constituting more of a menace than the importation of foreign oil. Current rates of gas imports he said are resulting in 100,000 bbl. of fuel oil being displaced daily.

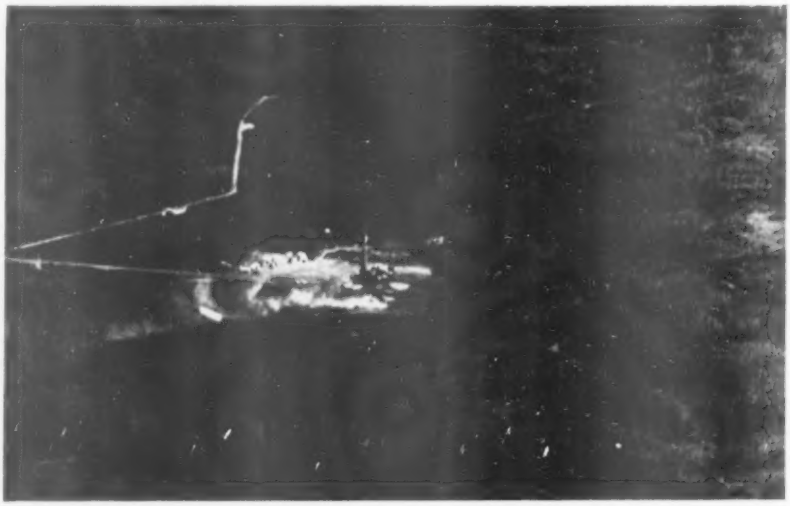
He did not offer any specific conservation law, "as the matter will require careful study and counseling together of all phases of the industry."

Drill Island Nearly Finished

LONG BEACH.—If all goes well, Monterey Oil Co. expects to spud the first well from its drilling island 1½ miles offshore from Seal Beach shortly after April 1.

The 75-ft. diameter earth-filled structure is being constructed in 42 ft. of water, and will be the site of one vertical and two slant holes. These will test a 1,400-acre submerged lease, jointly held by Monterey and The Texas Co., which was granted by the state in 1947.

Contract for the three wells has been let to Brown Drilling Co., with the work being carried out on a day rate basis. Monterey will provide barge transportation for the drilling crews, and for servicing the rig with pipe, cement, drilling mud, and other supplies.



Canadian Rig Drilling With Air

The rig shown drilling here about 50 miles above Fort St. John, British Columbia, is believed to be the first ever used in Canada to drill with air instead of drilling mud. The well is Gulf States Oil Co. 1 Gundy in the so-called Blueberry area. It is nearing completion. Smoke-like vapor coming from rig actually is pulverized cuttings blown out with air. Gundy 2 now is being drilled 2 miles north and 2.6 miles west of Gundy 1.

NORDBERG ENGINES
help set new efficiency standards on SHELL PRODUCTS PIPE LINE

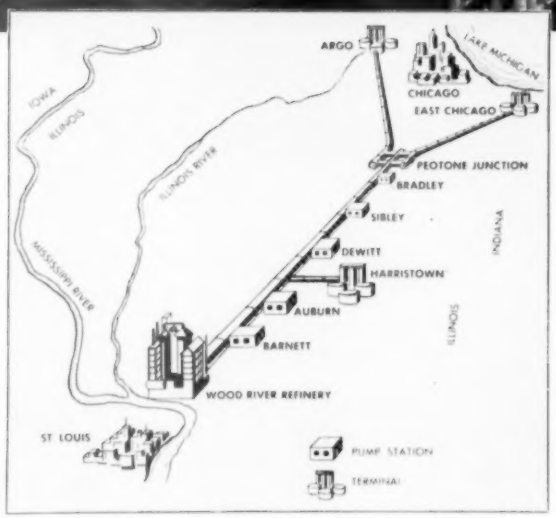
INCORPORATING the most modern concepts of products pipe line and station design, Shell Oil Company's new 14" Wood River carrier has been referred to as a "*Pipe Line of the Future*".

Helping to establish new standards of efficiency and safety on this line are two new Nordberg four-cycle supercharged Diesel engines with eight cylinders of 13" bore and 16½" stroke, each rated 1210 hp at 460 rpm, driving a centrifugal pump with a capacity of 4160 barrels per hour through speed increasing gears.

One of the many unique features of this new line is the automatic starting and operating system for the control of the pumping units, which adds speed and flexibility of operation, with a minimum of personal attention.

Modern pipe line pumping operations like this can be successful only when the power job is assigned to reliable, heavy duty prime movers. That's why more and more pipe line operators are installing Nordberg Engines . . . in sizes up to 4260 hp.

Write for further information outlining your power requirements.



The new 14" Shell line runs 279 miles between the Wood River refinery and terminals at Argo, Illinois and East Chicago, Indiana—replacing an old 8" line. 1210 hp Nordberg Supercharged Diesels are installed in stations at Auburn and Sibley, Ill.

NORDBERG MFG. CO., Milwaukee, Wisconsin

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Cycling Controversy

Major producers object strongly to plan proposed by 24 independents for pressure maintenance in Woodlawn field

AUSTIN.—A hard-fought battle currently is being waged before the Texas Railroad Commission here as to whether cycling or pressure-maintenance operations should be conducted in the Pettit producing formation of big Woodlawn field of Harrison County, East Texas.

Operators took two widely separated positions at a show-cause hearing on why gas produced should not be cycled and why pressure maintenance of the oil reservoirs should not be conducted.

Stanolind Oil & Gas Co., the field's biggest producer, Warren Petroleum Corp., and a few others are opposing any such order on the ground that it would be unjustifiable economically and impractical without unitization. Unitization this faction contends, would be extremely difficult if not impossible because of the many divergent interests in the field.

Pressing for a cycling order is a group of 24 independent operators with production in the field.

Stanolind argument . . . Testifying for Stanolind, J. C. Farris, district engineer at Longview, said that cycling operations would result in no appreciable increase in oil recovery.

Woodlawn, he said, is primarily a gas field. There were as of the first of February 26,411 surface acres assigned gas wells and only 1,640 acres assigned oil wells, for a ratio of 16 to 1. He figured the ratio of net feet of pay at 9 to 1 in favor of gas, placing the maximum optimistic net oil acre feet at 52,711 and the net acre feet of gas production at 487,000.

Farris said a relatively low sweep efficiency would result from a cycling program. Such a program, he estimated, would result in the recovery of about 660,000 bbl. of additional oil during the 15 years needed to deplete the reservoir, while at the same time more than 8 billion cubic feet of gas would be burned as compressor fuel.

Under a field-wide pressure-maintenance program, Farris estimated, about 1,430,000 bbl. of black oil and condensate could be recovered. To make $8,800,000 in additional revenue, he said, the operators would have to spend $8,390,000 for a net recovery of only $410,000 during the 15 years. The program also would mean losing 3,310 billion B.t.u. in heating energy, he said.

Recoverable reserves from the field under primary operations were estimated by Farris at 273 billion cubic feet of gas and 22,600,00 bbl. of liquids. Cycling actually would cut recoverable gas reserves by 8 billion cubic feet, he said, and result in an increase of only 1,430,000 bbl. in recovery of liquids.

The opposition . . . The Stanolind argument was challenged by William Hurst, petroleum reservoir engineer for D. E. Whelan and R. J. Whelan.

Hurst said there is pressure communication between gas and oil, and evidence of migration of oil in the 1 Keys well. In a year's time, he said, production from this well changed from water-white condensate to an oil-colored liquid having crude characteristics.

Hurst's division of acreage to oil and gas production clashed violently with that of Farris. The former assigned 9,280 acres of the upper Pettit in the field to oil production and 23,472 to gas, plus another 24,760 acres to gas in the middle Pettit for an over-all ratio of about 5 to 1, gas. He said that the middle Pettit is a broken-type formation containing only gas.

Original reserves in place in the upper Pettit, Hurst estimated, were 40,000,000 bbl. of oil and 125.806 billion cubic feet of gas. Those in the middle Pettit he set at 53.312 billion cubic feet of gas.

So far, he estimated, a total of 26,510,763 reservoir barrels has been produced from the field—97.8 per cent of it in the form of gas, the rest of it oil. Of this total figure, he estimated that Stanolind had produced 20,488,424 reservoir barrels, or 77.28 per cent.

Review of Allowables Set

SANTA FE.—The New Mexico Oil Conservation Commission will study charges of the commission's chief engineer, E. B. Macey, at its next hearing this month that the state's present allowable schedules are penalizing the operators of shallow wells.

The state agency has just finished a study of information furnished by operators on drilling, material, and special service costs of wells of various depths.

This survey, Macey declared, shows that "the shallow-pool operators are being penalized by the high allowables assigned to the deeper wells. The adjustment we contemplate making will tend to make the situation more equitable."

Present factors used to determine allowables have been in use 8 years. The basic unit allowable set each month is multiplied by the depth factors to give the production allowable of wells at various depths, thus permitting the deeper, more expensive wells to produce more oil.

Macey added that while all drilling costs have gone up, those of deeper wells haven't risen as fast as the shallower ones.

New Cambrian Find

Thick pay found by Skelly in North Dora field test

SWEETWATER.—A new link has been added to the growing chain of Cambrian producing fields stretching northward from Bronte in Coke County, through White Flat in northeastern Nolan County.

Skelly Oil Co. 3-B Boyd, development well in North Dora field, was the new center of interest as the Cambrian discovery for the field. The well has been completed for an initial potential of 1,987 bbl. of oil a day.

On one drill-stem test the well flowed 73 bbl. of oil in 1 hour, and further drilling and coring yielded 165 ft. of possible Cambrian pay section. However, water was encountered and completion was made from a 125-ft. section above water, starting from around 5,958 ft. Total depth was 6,102 ft., plugged back to 6,070 ft. Operators have reported the sand as having exceptionally good porosity and saturation, and recoveries are expected to be unusually high.

North Dora field . . . North Dora field is 4 miles south of multipay White Flat field, which a year ago attracted considerable attention to the possibilities of Cambrian oil. American Trading & Production Corp. drilled the first Cambrian well in that area and then completed two successful stepouts. Pay sections in these wells ran up to 200 ft. in thickness and permeability and saturation were said to be excellent. Since

then, geologists have come up with reservoir estimates on Cambrian recovery that approach 35,000 bbl. per acre.

Furthermore, when drilling to the Cambrian, operators are offered a number of pay objectives. At this writing, North Dora field comprises seven wells producing from the Ellenburger and two producing from Caddo limestone. To the east of Skelly's well, pay has also been found in the Strawn. Skelly 3-B Boyd made a good flow of oil from Caddo limestone.

White Flat field had production from Strawn, Caddo, and Ellenburger sections before the discovery of Cambrian pay. Rapid development of the latter formation has added Wilberns dolomite and Hickory sand as two distinct producing formations in the Cambrian.

Leasing in the new so-called Cambrian trend is tight to nonexistent, but the economic depth, plus the chances of more than one objective, has created a new interest in West and West Central Texas.

(For a discussion of the Cambrian formation, see page 195.)

SACROC Order Set

Request for rehearing denied Moncrief et al

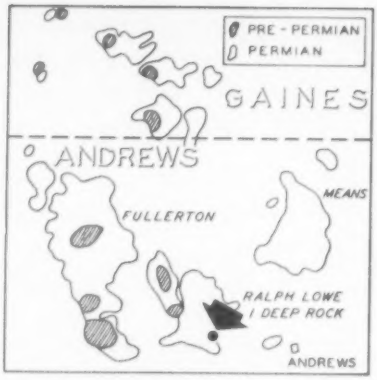
AUSTIN.—The Texas Railroad Commission last week unanimously denied a motion for rehearing filed by W. A. Moncrief et al on the SACROC secondary-recovery program in the Canyon Reef of Kellly-Snyder field, Scurry County, West Texas.

In a special order, the commission said it had heard the arguments "en banc" and found that the motion for rehearing was without merit. The ruling was made effective March 1.

The commission also ruled that the authority granted in its original order approving the program "was intended to be and is hereby directed to the SACROC unit, the operator of the unitized properties in Kelly-Snyder field."

The commission originally approved plans proposed by SACROC January 18 after months of hearings on the controversy. Moncrief filed motions for rehearing and for renewed oral argument February 1, contending that the commission should set aside its entire order or amend it substantially.

The Moncrief request was made on grounds that the SACROC plan would result in premature abandonment of wells owned by operators which Moncrief represented. All of this production lies in an area considered on the fringe of the reservoir.



Pre-Permian Well

Andrews County strike completed in Ellenburger

MIDLAND. — Pre-Permian production has been opened in another area of central Andrews County with the Ralph Lowe 1 Deep Rock, completed flowing 407 bbl. of oil a day from 69 ft. of Ellenburger pay topped at 12,252 ft.

Location of this new strike is in an area that has been under intensive geological study since discovery of Andrews-Wolfcamp field, with its 1,000-bbl. wells, just west of the town of Andrews. It is southeast of deep production in the Shafter Lake-Ellenburger area but separated by a dry hole which drilled to the Ellenburger. Correlated on top of the Ellenburger, 1 Deep Rock checked 151 ft. higher structurally than this failure.

To the north are shallow Yates sand gas wells in Shafter Lake field, and to the south are wells which produce from middle-Permian pays.

New hot spot . . . The next area which will bear watching is directly north of Lowe's discovery, encircled by Fullerton, Shafter Lake and Means fields. This large non-productive area has long been a question mark to the industry, although it is spotted with a few deep tests.

Current bright spot in this picture is Hunt Oil Co. 1 White, not shown on the accompanying map, but located directly north of 1 Deep Rock and about even with the northern tip of Means field. This wildcat has recovered oil on drill-stem tests in the upper Permian, and has flowed up to 50 bbl. of oil an hour in the lower Permian, probably Wolfcamp. The Devonian has yielded heavily oil-cut mud and flow tests of the Ellenburger have gaged up to 75 bbl. hourly. Currently the well is waiting on orders for completion tests.

New Tax Bill Due

Texan says he's ready to propose gas-severance tax

AUSTIN.—Recent statements by gas-producer groups in Texas that they would vigorously oppose any further hike in gas-production taxes, apparently fell on deaf ears as far as State Rep. Robert Patten is concerned.

Patten revealed last week that he would propose a new severance tax on natural gas at the special session of the legislature this week which would bring in about $40,000,000 annually.

The bill would levy a tax of 1 cent per M.c.f. against the producer. In a letter to other legislators, Patten said:

"I believe we should utilize in Texas our tremendous natural resources to pay for a bigger part of our public expenditures than we have in the past. As all of you know so well, we are blessed beyond most states and most peoples in this respect. If you agree that this source should be used for additional taxes, instead of taking taxes from the laborers in the form of a sales tax, then I think this is a bill that you can depend upon as being constitutional—perhaps the only tax on gas that will not go again to the courts."

Rhubarb . . . Meanwhile, Gov. Allan Shivers and House Speaker Reuben Senterfitt were engaged last week in a hassle over just how additional revenue, if it can be supplied, would be spent to raise Texas teachers' salaries.

Shivers has come out in favor of a three-point program which would:

. . . Raise the minimum salary for teachers by $402 a year.

. . . Require local districts to contribute 20 per cent of total state public schools costs instead of a present limited amount of $45,000,000.

. . . Give state aid amounting to $100 per teaching unit for local school building costs.

Senterfitt condemned the third proposal as the most vicious threat that Texas taxpayers have ever faced. He said it would come closer to costing the state $500,000,000 yearly than the $5,000,000 estimated by the plan's backers.

Producing Subsidiary Moved

HOUSTON.—Texas Gas Transmission Corp. has changed the name of its producing subsidiary from Louisiana Natural Gasoline Corp. to Texas Gas Exploration Corp. and moved the subsidiary into larger quarters here with plans for more active development.

Turks Pass Oil Law

Turkey's national assembly passes modified legislation giving foreign companies green light for oil development

Dahl M. Duff

DENATIONALIZATION of oil in Turkey became a reality last week when the Grand National Assembly in Ankara gave legislative approval to a comprehensive new oil law.

Despite several modifications made by the government to quiet strong political opposition, the final terms of the bill appear to offer a satisfactory basis for foreign-company operations in the heretofore closed country.

Eight or ten foreign companies have been doing geological work in Turkey in anticipation of the passage of the law. Full-fledged exploration concessions can be taken by those of the companies that have found the geological prospects sufficiently interesting.

Among the main provisions of the Turkish law are:

. . . . **Six year exploration concessions** in a particular district. Exploitation concessions run 40 years with a possible 20-year renewal. This was a change from the government's original draft which provided 50-year exploitation period with a 25-year renewal.

. . . **A maximum of 400,000 hectares,** or about 988,000 acres, on exploration concessions. The prospective regions of the country will be divided in areas not exceeding 50,000 hectares, or about 123,500 acres, and no one company can hold more than eight of these. Expoitation is limited to not more than eight concessions, each of which has a maximum of 25,000 hectares, or 61,800 acres, thus requiring a 50 per cent acreage conversion.

. . . **A 50-50 split of profits** with the government through a special surtax. This comes in effect once the original investment is recovered. Basic royalty is one-eighth, and the operators must pay normal Turkish corporation income taxes. If insufficiently productive, a concession may be abandoned at the end of 3 years.

. . . **A 27½ per cent depletion allowance,** the same as that granted in the United States. For tax purposes, operators can spread losses incurred in one fiscal year over the next 10 years. Necessary equipment may be imported into Turkey duty-free. Provision is made for the free transfer out of Turkey of the original capital investment and net profits after taxes.

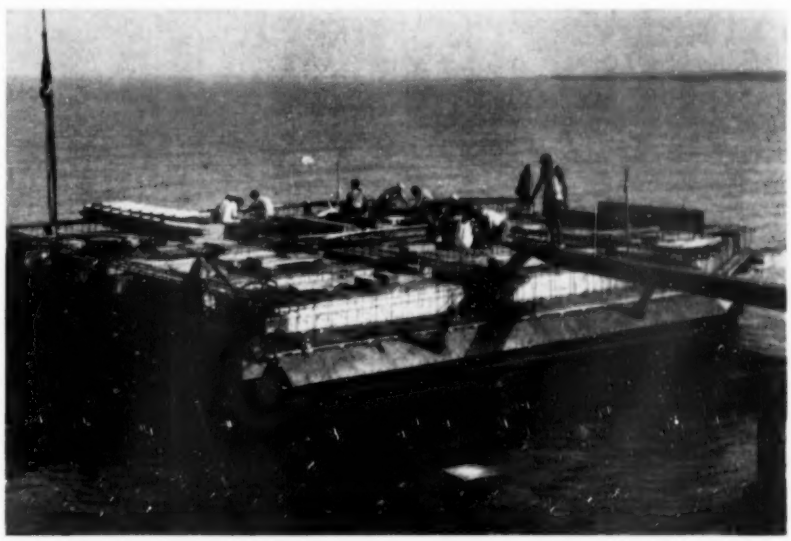
. . . **Right to appeal disputes** arising under contracts to a petroleum commissioner appointed by the government, and finally to the Turkish Council of State, the supreme administrative authority in the country. Oil matters will be handled by the government's Petroleum Administration. A concession may be refused on grounds the applicant lacks necessary capital or technical qualifications, because a grant is not in the national interest, or for security considerations. Concessions may not be given to any company in which a foreign government has controlling interest, but in exceptional cases, this requirement may be waived by the Turkish Cabinet. A foreign company may employ non-nationals on its staff, but is obligated to send a certain number of Turkish citizens abroad for special training.

The Turkish Government in the latter part of 1952 announced its decision to throw the country open to foreign exploration. Recognizing the tremendous capital needs of the industry, the government said the results of some 20 years of exclusive state operations had been unsatisfactory. Subsequently, Max Ball, Washington consultant, was retained to assist in preparation of the draft of the new petroleum law.

Original bill attacked . . . The government's bill was introduced in the assembly early in January. It came under unexpected and heavy political attack, but later a leader of the opposition Republic People's Party gave assurances the party would respect the terms of the bill if it came into power in the general elections this May. This statement allayed the concern of some foreign company officials over the opposition to the law.

Missing from the final version of the law was a clause which provided that the concession rights granted constituted a contract between the Turkish State and the operator. This provision, in effect a legislative guarantee against nationalization making the contracts irrevocable, had been especially criticized by the opposition groups.

The law was passed at a special session held in last-minute rush before the mandatory dissolution of the assembly March 12. The margin in its favor was considerably less than had been expected several months ago. The Republic Party with 53 members abstained from voting, and the government party mustered 266 votes for the measure.



Third Jetty Building at Iraq Terminal

The Fao terminal on the Shatt-el-Arab River in Iraq is becoming of growing importance as a shipping point for Middle East crude oil. It handles production from Zubair field of Basrah Petroleum Co., Ltd., in southern Iraq. Here work is under way on a third jetty at Fao. There will eventually be four jetties at the terminal. It is linked with the field by a new 24-in. pipe line as well as an older 12-in. line (Iraq Petroleum Co. photo).

22 more than the required majority. There were 17 votes against the bill.

Government company formed . . . At the same time, the assembly passed a companion measure creating a government-controlled Turkish National Petroleum Co. to operate the two existing fields — the only producing areas in Turkey—and to continue exploration on behalf of the government. This company is authorized to seek exploration concessions on an equal basis with private interests. It will take over the partly completed refinery now being built by the government near Ramandag and Garzan fields.

The law provides that 51 per cent of the stock of this company will be in the hands of the government. The remaining stock will be offered to private interests. The company will have an initial capitalization equivalent to $54,571,000. This new company will succeed the Turkish Mining Research Institute which discovered Ramandag and Garzan in the program it has been carrying out in Turkey for many years.

Companies interested . . . The companies which have been making geological studies in Turkey include large international firms and several groups of smaller operators. Among them are: Standard Oil Co. (N.J.), Socony-Vacuum Oil Co., Inc., Gulf Oil Corp., Royal Dutch-Shell, Caltex, Conorada Petroleum Corp., Cities Service Co., and Canada Southern Oils, Ltd. These companies, and other prospective concessionaires, have been watching the legal situation closely.

Main interest in Turkey is in the southeastern part of the country where the two existing fields are situated, and in the Alexandretta Gulf basin in Adana and Hatay bordering the Mediterranean. Opinions on the prospects of finding large fields in Turkey varies; some geologists feel smaller accumulations all of whose production would be taken internally are more likely.

Copters in Ferry Service

FORT WORTH. — Two helicopters have been shipped by Bell Aircraft Corp. here to Aerotecnica S.A. in Venezuela for 24-hour charter service for Shell Oil Co.

The three-place copters will be used to ferry personnel and equipment to and from offshore drilling rigs in Lake Maracaibo, some of them as much as 12 miles from shore.

The helicopters will replace a fleet of motor boats now used and are expected to save Shell considerable money by minimizing costly production shutdowns.

Dispute Settled

Egypt, producing companies reach new price agreement

A SIX-YEAR-OLD dispute between the Egyptian Government and Egypt's main producing companies, Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum Oil Co., Inc., has finally been cleared up.

At issue between the government and the companies since 1948 has been the government's system for pricing products on the domestic market and the government's action in withdrawing exploratory licenses applied for earlier on a number of areas.

Hassan Boghdadi, the Egyptian minister of Commerce, announced in Cairo that outstanding differences with the companies had been settled. He said a new pricing agreement had been negotiated with the companies to replace the one invalidated by the Wafd regime in 1952, and that the government would restore to the companies the exploration licenses on some 60 areas as well as an exploitation lease for the Ras Matarma field discovered in 1948 by A.E.O.

Furthermore, the minister said, the government will liquidate by installments its debt of 2,000,000 Egyptian pounds ($5,760,000) to the oil stabilization fund. It is out of this fund that the companies are compensated for the uneconomic price at which they are required to sell certain products on the Egyptian market.

Results . . . The agreement apparently opens the way for renewed exploratory work by these two companies which now handle all of Egypt's present crude output. Because of the differences with the government, the companies had discontinued exploratory work and confined their operations to producing existing fields.

Officials of the companies have warned Egypt's present fields are fast being depleted. Asl field, in the Sinai, dropped off sharply in recent weeks, and it has been predicted that production this year will be about 12,000 bbl. daily less than the approximately 46,000 bbl. daily in 1953. It is not expected that whatever results are obtained by International Egyptian Oil Co. in southern Sinai, by Continental Oil Co. and Ohio Oil Co. in the Western Desert, and now possible new activity by A.E.O. and Socony-Vacuum will come soon enough to reverse this trend in the current year.

Egyptian Concession Contract Approved Formally

A major exploratory effort will be undertaken in the Western Desert of Egypt as a result of the concession contract recently signed by the Egyptian Government and Conorada Petroleum Co. At signing of agreement in Cairo were, left to right: (standing) Mahmud Makhlouf, Conorada legal adviser; (sitting) Hassan Boghdadi, deputy minister of commerce and industry since named minister; A. A. Curtice, president of Conorada; Helmi Baghat Badawi, former minister of commerce and industry, now retired; William F. Penniman, Conorada representative in North Africa, formerly with the U. S. State Department; and Mahmud Abou Zeid, director of the Egyptian Department of Fuels.

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Iran Talks Continue

British deny they insist on a controlling interest

TOP executives of eight major international oil companies were meeting last week in London to iron out final details of the joint organization which will reactivate the Iranian oil industry.

The company officials were to decide on the members of a mission which will leave for Teheran in the near future to present the proposals to the Iranian Government and negotiate a new agreement.

In London, an official of Anglo-Iranian Oil Co., Ltd., issued a denial that Anglo-Iranian had insisted on a majority and controlling interest in the proposed international consortium. Earlier, reports had attributed the delay in approval of the consortium to such a position on the part of the British company.

Earlier reports indicated the U. S. State Department considered that the Anglo-Iranian interest together with that of Royal Dutch-Shell gave a British majority which would not be acceptable to the Iranian Government. In this connection, British quarters emphasized that Royal Dutch-Shell is a group 60 per cent owned by the Dutch and 40 per cent by the British.

Interest allocation . . . It is now understood that the final allocation of interest provides for 40 per cent Anglo-Iranian, 40 per cent for the American companies, and the remaining 20 per cent for other interests, including Royal Dutch-Shell and Anglo-Iranian. This is reported to be the basis on which the company officials will decide this point in their current London meetings. The way in which the total American share will be split among the individual companies has not been indicated.

American company executives attending the London discussions were: Orville Harden, retired vice president of Standard Oil Co. (N. J.); B. Brewster Jennings, president, Socony-Vacuum Oil Co., Inc.; R. G. Follis, board chairman, Standard Oil Co. of California; Sidney Swensrud, board chairman, Gulf Oil Corp.; and A. C. Long, president, The Texas Co.

Representatives of the eight companies have been working in London since early January on what has been described as the fantastically complicated task of setting up an international consortium to market the production and supervise operations of the Iranian properties. European companies involved are: Anglo-Iranian, Royal Dutch-Shell, and Cie. Francaise des Petroles.

Stage setting . . . Herbert Hoover, Jr., special Iranian oil adviser to the U. S. State Department, arrived in London early last week and went into consultation with British Foreign Office experts. Dennis Wright, counsellor of the British Embassy in Teheran, flew in from the Iranian capital to take part in the discussions.

All this activity was setting the stage for the dispatch of the negotiating team to Iran. Careful preparatory moves have been made over the last 4 or 5 months with the American and British officials obviously seeking to work out a set of proposals which can and will be accepted by the Iranians.

On the Iranian side, reports from Teheran indicated the Zahedi Government was ready to begin the formal negotiations. However, rumors of fresh internal opposition to the Zahedi regime continued to crop up, and it was reported last week that General Zahedi himself had threatened to resign in a dispute with the Shah over control of the army.

Concessions Talked

Venezuela asks companies for indication of interest

PRELIMINARY discussions of new concession acreage have taken place recently between representatives of individual oil companies and officials of the Venezuelan Government in Caracas.

Various companies have been asked to indicate the areas in which they are interested and what could be expected in the way of offers. The proposals were described as preliminary and tentative, not binding on either the government or the companies.

This move was interpreted as an effort on the part of the government to determine more definitely the current degree of interest in acreage grants and to gain information on which to base a decision as to whether awards will be made.

No new concessions have been granted in Venezuela since 1945, and the question has been debated intermittently for the last several years by the press and public in Venezuela. In the latter part of 1951, the government solicited offers totaling well over $150,000,000, but took no further action.

Venezuelan officals are understood to be increasingly concerned over competition from Middle East oil and the successful capture of some important markets by crude from this region. This counters one of the arguments against granting new concessions. Namely, that reserves in prospective uncommitted areas should be held as insurance against the future.

In addition to this, the Venezuelan government also is understood to be in need of more cash income to meet expenses of the public-welfare and development projects that have been undertaken.

The companies that have been asked for preliminary proposals include several not now operating in Venezuela, as well as the present group of producing companies in the country. One official said the Venezuelan government seems interested in attracting new companies which have assured market outlets available.

Another source remarked that it is anybody's guess as to whether the government will go ahead and throw the country open to acreage awards. No action is considered likely in any case until after the close of the Tenth Inter-American Conference now being held in Caracas. This diplomatic meeting is expected to continue for the next several weeks.

International Briefs

Preliminary geological studies by Panhandle Oil Corp. in British Guiana and in Colombia have failed to indicate attractive oil possibilities. Panhandle Oil of Canada, Ltd., a subsidiary, last year, had two geologists studying the coastal section in northwest British Guiana under exploration license. In Colombia a large area was taken under option and investigated. However, Panhandle Oil said in its recent annual report that the preliminary work failed to indicate the advisability of further work and expense.

Nederlandse Aardolie Mij. (Royal Dutch-Shell and Standard Oil Co. [N. J.]), has filed an application with the Dutch Government for an exploitation concession over an area of 16,650 hectares (41,000 acres) in the province of South Holland. The area comprises parts of the municipalities of The Hague, Delft, and Rotterdam. Early in 1953, the company made an oil discovery at Rijswijk on the outskirts of The Hague. The area produces crude of about 32° gravity from Lower Cretaceous formations at around 4,900 ft. Only other production in the Netherlands is in Schoonebeek field where N.A.M. produces about 15,000 bbl. daily.

New Vice President

Loughney steps up to new post with Canadian Gulf

AN accountant who acquired a broad knowledge of producing operations and company administration has been elected a vice president of Canadian Gulf Oil Co., Canadian subsidiary of Gulf Oil Corp.

The duties of E. D. Loughney will change little with the new title. He has been general manager of Canadian Gulf in Calgary, Alta., since 1951 and will continue directing its expanding exploration and production operations.

Loughney's first oil-industry job was in the warehouse department of the old Gypsy Oil Co. in 1927, which he took shortly after being graduated from the University of Oklahoma with a degree in business finance and law.

His movement upward into the ranks of executives was through the financial route, first as an employe in the accounting department of Gulf's Tulsa production division and later as division auditor. He also gained valuable experience for his present job while working for a year as executive assistant to P. H. Bohart, Gulf vice president.

The task of directing a company's growing activities in busy Canada is enough to keep even an energetic and serious-minded executive like Loughney pressed for time. However, he still manages to fish and bowl and to work in civic and profesisonal organizations.

His ability and eagerness to get things done is reflected in his outside activities as well as those connected with his job. While in Tulsa Loughney belonged to several civic and professional organizations and acquired a reputation of never being content to be just a member.

He was president during the 1950-51 term of the Tulsa chapter of the National Association of Cost Accountants, previously serving as vice president and a director for several years. Loughney also is a past president of the Petroleum Accountants Society of Oklahoma, and was a member of the original group which organized the annual petroleum accountants conference held at the University of Tulsa.

He participated in activities of the Tulsa Community Chest, and also served as chairman of the finance and accounting committee of the American Petroleum Institute's fourth and fifth regions.

Since moving to Canada he has become active in the Western Canada Petroleum Association and various other groups in Calgary.

His new home, only 80 miles from Banff Springs and not much farther from Lake Louise, is encouraging him to do more fishing. What little vacation the 58-year-old executive was able to squeeze into his busy schedule last summer he spent fishing with his wife and two children at Banff.

His duties keep him at his desk much of the time, but whenever possible he drives to the operating sites, taking to the air when heavy snows clog the roads.

Donald E. Richardson, formerly geologist with Sohio Petroleum Co., has joined Hanley Co.'s land and exploration department as subsurface geologist at Midland, Tex.

William D. Thomas, formerly coordinator of research and production work for American Cyanamid Co.'s petroleum chemicals department in New York, has joined Southwest Research Institute at San Antonio, Tex., as fuels and lubricants technologist for the department of chemistry and chemical engineering.

D. C. Norwood, Norwood Drilling Co., Midland, Tex., has been elected president of the North Texas Oil and Gas Association for 1954, succeeding **Eugene B. Clark,** owner of E. B. Clarke Drilling Co., Wichita Falls, Tex. **Charles Protho,** vice president of Perkins-Protho Co., Wichita Falls, was reelected first vice president. New second vice president is **Wayne O. Watts,** partner in Walsh & Watts, Fort Worth.

M. I. Kirsch, drilling supervisor for Continental Oil Co., has been transferred from Harper, Kans., to Aberdeen, Wash.

William G. Allen, supervisor for Keystone Exploration Co., has been transferred from Billings, Mont., to Houston.

Geoffrey Barrow, formerly staff geologist of International Petroleum Co., Ltd., has been named assistant advisor of the exploration department of International at Coral Gables, Fla.

Robert S. Breitenstein, geologist with The Texas Co., has been transferred from Fort Worth to Farmington, N. M.

Clarence D. Netherland has joined Gruy & Durst, Fort Worth petroleum and geological engineering firm. Netherland has been with Southern Production Co. in Fort Worth for the last 1½ years, doing engineering and economic analyses of gas production and gas-plant operations and proration problems and reservoir studies.

W. A. McFadden, Jr., has resigned as supervisor at Billings, Mont., for Southern Geophysical Co. to open a geophysical and geological consulting office in Dallas. He was employed by Standard Oil Co. of Texas for 15 years in the exploration department prior to joining Southern Geophysical.

J. L. Ashworth, formerly district superintendent of the products pipe-line division of Standard Oil Co. (Ind.) at Rensselaer, Ind., has been transferred to Moorhead, Minn., as district superintendent in charge of the line from Minneapolis-St. Paul to Mandan. A maintenance headquarters will be established at Moorhead.

John A. Murphy, chief reservoir engineer for Continental Oil Co., has been promoted to assistant to the vice president. He joined Conoco in 1948 as a reservoir engineer and was named chief reservoir engineer in 1950. Murphy will be succeeded by **Wallace W. Wilson,** who has been with the production department since 1950. **John R. Spencer,** reservoir engineer, has been promoted to assistant chief reservoir engi-

neer succeeding Wilson. **William L. Boyd, Sr.,** reservoir engineer, has been promoted to supervising reservoir engineer succeeding Spencer.

Frank Bethel, formerly exploitation engineer in Shell Oil Co.'s technical services division at Houston, has been transferred to Glendive, Mont.

Augusto Barrinetos has been appointed to head the fiscalization section of the Colombian Ministry of Mines and Petroleum. He succeeds **Alberto B. Vargas** who has joined the staff of International Petroleum Co. (Colombia), Ltd. **Alberto Sanmiguel** is now assistant director of the section.

Douglas Robinson, Queen's Counsel, has been appointed vice president of Canadian Oil Companies, Ltd. He originally set up Canadian Oil's legal department and has served as general counsel and secretary of the company.

R. P. HUGGINS

R. P. Huggins has been transferred by Gulf Oil Corp. from Houston to Pittsburgh, where he will direct the company's crude-oil purchases and products supply operations. The newly formed crude-oil and products supply department combines the activities of products supply and distribution, formerly directed by the domestic marketing department and crude-oil purchasing. Huggins, with Gulf 33 years, has been vice president in charge of crude-oil purchases at Houston since 1952, and previously was a vice president of Western Gulf Oil Co., a West Coast production subsidiary. **R. O. Jennings,** formerly director of supply for the domestic marketing department, has been made manager of products supply and distribution.

Kevin J. Forderbrugen, formerly an engineer for the San Diego Gas & Electric Co., has been named manager of the North Dakota Natural Gas Transmission Co., which has an application pending before the North Dakota Public Service Commission to build and operate a 500-mile natural-gas pipe line in North Dakota *(The Oil and Gas Journal, February 15, page 104).* Forderbrugen is headquartering at Minot, N. D.

Canadian Technical Society Names New Officers

The Calgary, Alta., branch of the Oilfield Technical Society has elected new officers for 1954. In the front row are, left to right, A. Fraser MacDonald, Shell Oil Co., treasurer; D. R. Craig, Alberta Petroleum & Natural Gas Conservation Board, president; and L. C. Stevens, Socony-Vacuum Exploration Co., vice president. In the back row are, left to right, Marshall Taylor, British American Oil Co., Ltd., program committee; W. J. Cummer, General Petroleums of Canada, Ltd., program chairman; and J. F. Ross, Standard Oil Co. of California, and George Manson, National Supply Co., both of the program committee. A. F. McLachlin, Shell, secretary, is not pictured.

Rolla E. Hargrave, formerly consulting geologist in West Texas and Illinois, has joined Headwaters Oil Co. at Dallas as chief geologist.

C. W. Berger, formerly general superintendent of refining at Berry Asphalt Co.'s refinery at Waterloo, Ark., has been transferred to the firm's new refinery at Gary, Ind.

Don Ericson, formerly with Magnolia Petroleum Co. at Midland, Tex., has joined Sohio Petroleum Co. in Casper, Wyo., as staff assistant to **A. C. Munyan,** division staff geologist.

T. D. CABOT

Thomas Dudley Cabot has been elected president of Godfrey L. Cabot, Inc., Boston, succeeding **Dr. Godfrey L. Cabot,** founder of the firm. Cabot had been executive vice president for several years.

L. F. Heverly has resigned as chief corrosion engineer for Great Lakes Pipe Line Co., Kansas City, to do corrosion-engineering work under the firm name of Heverly Engineering Co., Kansas City, Kans. He was with Ebasco Services, Inc., for 3½ years prior to joining Great Lakes.

J. T. Anderson, formerly district foreman at Prague, Okla., for Kerr-McGee Oil Industries, Inc., has joined Ernie Boyt Drilling Co., Shawnee, Okla., as part owner.

Carl J. Taylor, Jr., Houston, has been promoted to the newly created position of assistant to Continental Oil Co.'s southwestern region general management with headquarters in Fort Worth. He formerly was an associate analyst in Conoco's coordinating and planning department in Houston.

Arthur D. Stewart, widely known petroleum economist, has retired effective April 1 after nearly 39 years with Socony-Vacuum Oil Co., Inc. Stewart gained recognition during the war for his work on several advisory committees on petroleum. Last year he was named chairman of the statistical subcommittee of the foreign petroleum-supply committee of the Petroleum Administration for Defense.

R. G. Bandy has resigned as manager of Midland Cooperatives, Inc., and of the company's refinery at Cushing, Okla. A three-man committee has been appointed by **Milo Dahl,** Minneapolis, production manager, until a permanent manager is named. It consists of **Carl A. Carlson,** company office manager at Cushing, chairman; **T. B. Randall,** refinery superintendent; and **J. A. Duncan,** petroleum engineer.

PERSONALS

K. L. Stillwell, reservoir engineer for Forest Oil Corp., has been transferred from San Antonio to Houston.

Will Gillett, chemical engineer in the process and design section of the natural-gas department of Magnolia Petroleum Co. at Dallas, has resigned to join Bowie Gasoline Co. at Dallas as chief engineer.

Raymond F. Hadley has been advanced by Sun Pipe Line Co. from electrical engineer to chief engineer in the products lines department. **Louis M. Miller,** formerly mechanical engineer, has been named assistant chief engineer, and **Robert C. Greer, Jr.,** formerly civil engineer, has been appointed construction engineer.

John W. Newton, vice president for refining of the American Petroleum Institute, last week appointed chairmen for several principal committees. Those named include **C. M. Ridgway,** Pure Oil Co., program; **E. B. McConnell,** Standard Oil Co. (Ohio), advisory; **C. E. Headington,** Atlantic Refining Co., analytical research; **C. E. Davis,** Shell Oil Co., automotive research; **J. H. Easthagen,** California Research Corp., disposal of refinery wastes; **R. C. Alden,** Phillips Petroleum Co., petroleum products; **R. H. Venn,** Humble Oil & Refining Co., refinery equipment; **D. S. Turner,** Standard Oil Co. (Ohio), training; and **W. L. Stewart, Jr.,** Union Oil Co., of California, smoke and fumes.

W. E. Strangman has been promoted by Union Oil Co. of California from geophysicist at Bakersfield, Calif., to staff geophysicist at Los Angeles.

F. S. McDonald has been named research and development engineer in the organic laboratory of Dow Chemical Co., Freeport, Tex. Others joining the company include: **C. A. Latta,** chemist in the organic laboratory; **J. H. Pitts,** production-development engineer in the student-training program; and **R. M. Smith,** chemist in the organic laboratory.

James B. Nance, formerly geologist for Carter Oil Co. at Liberal, Kans., has joined D. D. Feldman Oil & Gas, Dallas, as geologist in charge of the company's newly opened Oklahoma City office. **Earl J. Pruitt, Jr.,** has joined the company as geologist in the Texas Gulf Coast office at Houston. Pruitt formerly was geologist for Lion Oil Co. at Corpus Christi.

D. L. Cornell, with Tuscarora Pipe Line Co., Ltd., for about 8 years, has been made chief engineer.

Joseph A. Kornfeld has opened consulting offices in Tulsa for petroleum geology and evaluation work. He has been district editor for The Oil and Gas Journal at Tulsa, and previously, Houston. Kornfeld also formerly had been petroleum geologist-engineer with Sohio Petroleum Co. and The Texas Co.

Harry B. McClure has been advanced from executive vice president to president of Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corp.

Jack K. Baumel, formerly director of production and chief engineer of the oil and gas division of the Railroad Commission of Texas, and for the past 3 years petroleum consultant and technical adviser to the Venezuelan Government, has opened offices in Austin as a consultant in petroleum and natural-gas engineering.

DEATHS

Thomas Franklin Grisham, 70, president of Grisham - Hunter Oil Corp., Abilene, Tex., died in Dallas March 6. Grisham owned production in Jones and Throckmorton counties in North Texas and in Garza, Ector, and Ward counties, West Texas. He served as president of the West Central Texas Oil and Gas Association and was a director of several state petroleum organizations.

Arch Clevenger, 66, former partner in McQueen & Clevenger Co., drilling contracting firm in Fort Worth, and owner of substantial oil production, died in Big Spring, Tex., March 8. Clevenger spent his entire business life in the oil industry, starting at the age of 16 in 1904, and following major developments at Burkburnett, Mexia, Longview, Wichita Falls, and Midland, Tex., Hobbs, N. M., and Tonkawa, Okla.

Bernice B. Smith, 50, vice president and manager of operations for Loffland Brothers Co., died March 6 in Tulsa following a month's illness. He was with Meade Brothers, Inc., J. E. Mabee, and Arrow Drilling Co. for 15 years prior to joining Loffland in 1933. He was made a vice president in 1946.

John B. Sheehan, 69, general manager of Sheehan Pipe Line Construction Co., died March 10 in Tulsa. He had been hospitalized 10 days after illness forced him to return from his vacation in St. Petersburg, Fla. Sheehan helped organize the pipe-line construction firm in 1922 after coming to Tulsa from his native Bradford, Pa. Prior to this he was engaged in drilling at Sistersville, W. Va., and pipe-line construction at Independence, Kans.

Henry J. Rahlves, 73, Toronto, Ont., died recently in San Francisco. Prior to his retirement in 1945, he was manager of the marine department of Imperial Oil, Ltd.

Don L. Carroll, 51, chief of the minerals division of the Technical Cooperation Administration in Israel, died March 6 at Bethseda Naval Hospital.

C. Carroll Gould, 82, died recently in New Rochelle, N. Y. He joined the old Valvoline Oil Co. of New York in 1898 and retired in 1946 as vice president and secretary.

Ben R. (Uncle Ben) Nash, 72, retired oil scout for Houston Oil Co. of Texas, died recently at Beeville, Tex. He reportedly was the nation's oldest living oil scout.

Carl A. Johnson, 76, pioneer southern California independent producer, died recently in Pasadena, Calif., following a 6-month illness. He was president of Holly Development Co. and board chairman of Socal Oil & Refining Co. and Holly Oil Co. He also was a past president and director of the Independent Refiners Association of California and a director of the Western Oil and Gas Association. For the last 3 years he was a member of the executive committee of the Independent Petroleum Association of America and a former vice president of the I.P.A.A.'s California branch.

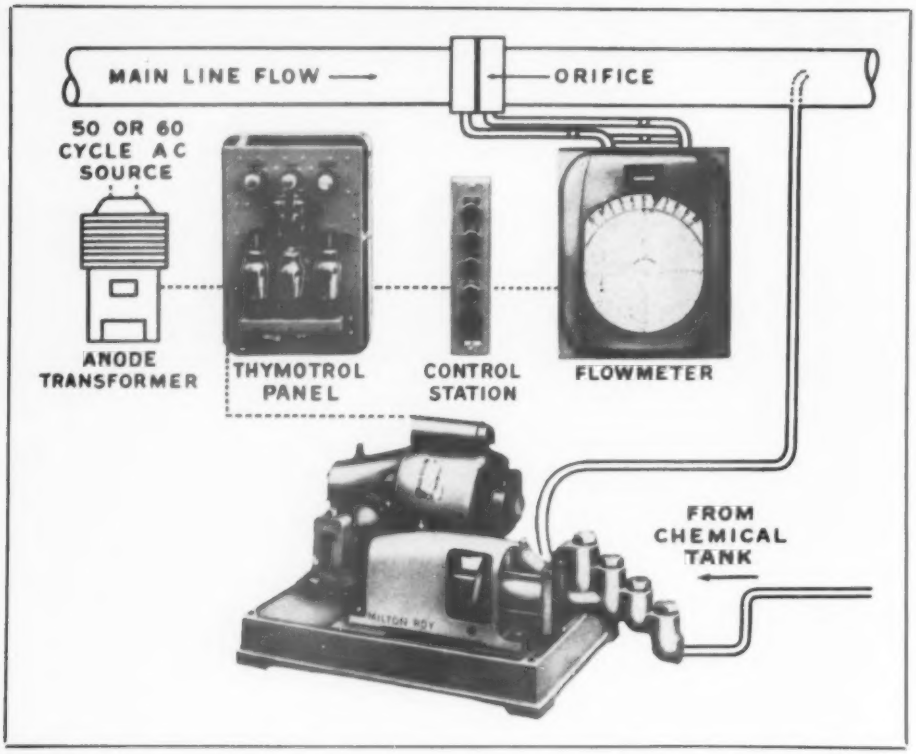


Fig. 1—Typical chemical feed system using a conventional flow meter to measure flow and automatically adjust pump capacity by motor-speed variation.

Instrumenting a Chemical Feed System

by R. T. Sheen

A CONTROLLED-VOLUME pump is an instrument designed to accurately meter liquids in measured volumes against a positive pressure differential between suction and discharge of pump. This metering action is possible with a degree of accuracy exceeding that of many flow meters—in most instances to a fraction of 1 per cent.

In a typical design the pump consists of a plunger reciprocating in a properly designed displacement chamber at a speed sufficiently slow to assure on each stroke complete positive displacement of a volume of liquid equivalent to a cylinder of plunger diameter and stroke length.

A double check valve is employed on both the suction and discharge of the displacement chamber. In the event one ball is held off the seat by a particle in suspension in the liquid being pumped, the chances are that the second ball will hold, assuring positive check-valve action. The liquid end is further designed to automatically discharge any air or gas that may enter with the liquid in a single stroke of the plunger.

Any pockets in the displacement chamber in which air could be trapped would impair the volumetric efficiency of displacement of the pump by permitting alternate compression and expansion of the gas bubble with reciprocation of the plunger.

The capacity of a controlled-volume pump is a function of three variables; area of the plunger, stroke length, and the speed. Adjustment of stroke is the

Author is president of Milton Roy Co.
Paper presented at fifth annual symposium on Industrial Instrumentation, College of Engineering, University of Florida, February 1-3, 1954.

Let's Correct Some Misconceptions . . .

THE scarcity of literature on this relatively new flow-control equipment is responsible, more than any other single measure, for the limited association between the low-capacity flow-control problems encountered in chemical feed systems, and their obvious solution. From the early use of these pumps for water treating, many engineers still regard controlled-volume pumps as water-treating devices only.

The inherent accuracy and flexibility of these pumps provides the key to accurate control of many continuous chemical treatments systems. Controlled-volume pumps conserve chemicals, since they both meter and pump the exact amount of chemical to the process. They save space and construction costs, since surge tanks and mixing chambers are smaller or in many cases eliminated. They complement control valves in ranges or under conditions where control valves do not normally operate. Controlled-volume pumps handle flow ranges of 3 ml. per hour to 2,700 gal. per hour and, unlike valves, are unaffected by variations in viscosity or pressure drop in the system. In effect, these pumps are really flow-control instruments.

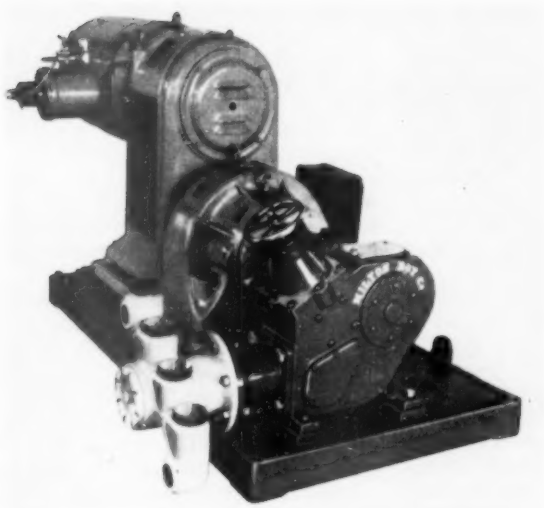


Fig. 2—Controlled-volume pump showing pneumatical control of variable-speed motor to effect capacity variations automatically.

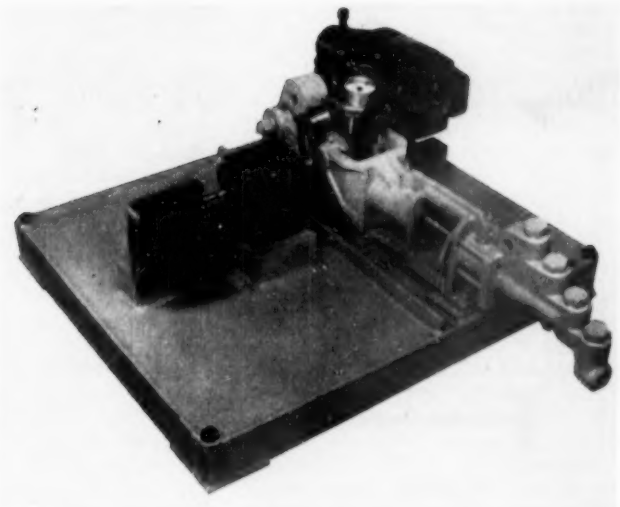


Fig. 3—Automatic stroke-length adjustment is obtained by using a reversible motor.

common method normally employed on a constant-speed pump for adjustment of capacity.

Automatic Speed Adjustment

Where motor-driven pumps are used in automatic chemical feed systems, a variable-speed motor may be used, with the pumping rate being automatically controlled by means of a control signal from an electronic or pneumatic instrument controller, as shown in Fig. 1.

Controlled-volume pumps will normally function efficiently at speeds as low as 1 s.p.m. to as high on certain applications as 100 s.p.m. With plunger diameter and stroke length of a given pump held constant, variation of speed within a selected portion of this range will affect the variation of the capacity delivered by the pump directly proportional to speed.

Accurate speed control can be obtained by means of electronic control such as the General Electric Thymotrol. Speed control over a range as high as 100 to 1 is possible by means of this system although the usual practical range is 10 or 20 to 1. At any given speed setting, speed is automatically held constant irrespective of change in load. This is a characteristic definitely necessary for application of this control to automatic chemical feed systems.

How it works . . . In Fig. 1 a conventional type of flow meter is used to measure main-line flow and to position a 10,000-ohm. potentiometer. The flow meter sets the potentiometer in direct relation to rate of flow and controls the speed of the motor on the pump automatically and, therefore, the quantity of chemicals delivered. Since motor speed is directly proportional to rate of flow, chemical feed is likewise directly proportional to flow.

Where a pneumatic controller is used, automatic control of stroking speed may also be effected by means of a variable-speed drive mounted on the controlled-volume pump. An air-piston operator receives a 3 to 15-psi. controlled air signal and, by changing the position of the cones in the variable-drive unit, varies the speed so as to increase or decrease the amount of control agent, as needed. The pump shown in Fig. 2 has a maximum capacity of 2,750 gal. per hour. At lower capacities, it can be used at pressures as high as 50,000 psi.

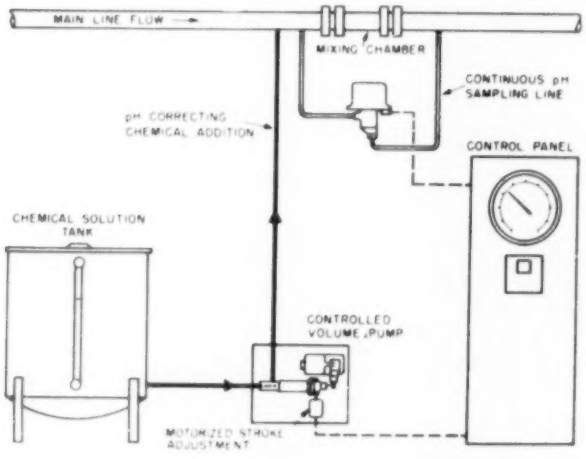


Fig. 4—Typical pH control system using motorized dial adjustment controlled-volume pump for addition of correcting chemical as required by pH controller.

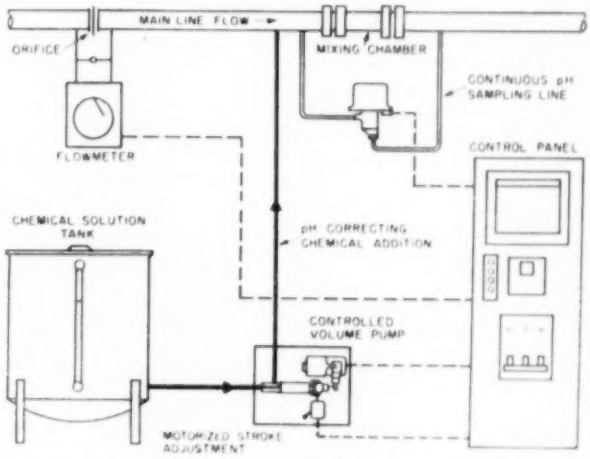


Fig. 5—The pH control system with flow compensation using motorized dial adjustment controlled-volume pump. Variable-speed motor drive varies pump capacity in proportion to flow.

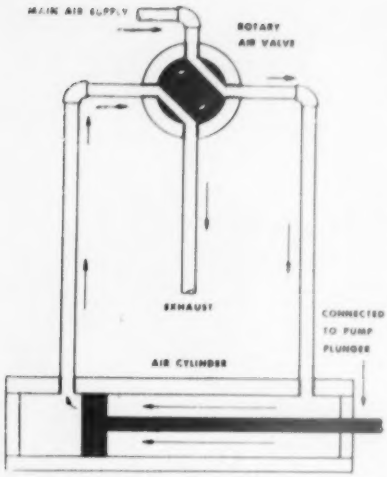


Fig. 6—Typical air-operated proportional feed system showing rotary air valve (mounted on positive displacement meter) controlling rate of stroking of air cylinder which powers air-operated controlled-volume pump.

Automatic Stroke-Length Adjustment

The speed control used in motor-driven controlled-volume pumps can be used in conjunction with pH meters and controllers in a pH-control system. The preferred approach for pH control, however, is through the use of motorized stroke adjustment. Motorized stroke adjustment is capable of reducing the length of the stroke entirely to zero so that if necessary and called for by the controller, the pump motor may be operating but there will be no chemical delivered by the pump.

A small reversible motor is connected to the pump as shown in Fig. 3. The other end of the high-speed shaft of this reversible motor drives through a gear-reduction train, to set a slidewire. This slidewire may be balanced with a slidewire in a controller on two legs of a Wheatstone bridge circuit. Automatic control of the length of the stroke is thus possible.

This finds application in automatic pH control systems regulating the length of the stroke automatically from a pH controller and thereby the quantity of chemical, acid, or alkali, fed to a process as called for by pH value (Fig. 4). In pH-control systems, it is necessary to allow for lag and rate of reaction. The systems must be designed properly to avoid hunting.

If a pH controller must follow a large change in rate of flow, considerable hunting will result. It is possible to compensate for variable flow on a pH-control system by using the two control variables on a single pump. As shown in Fig. 5 this is done by varying the speed of the pump through a Thymotrol to regulate the speed of the pump drive directly proportional to rate of flow and use the second variable, pH value, to automatically set the length of the stroke of the plunger on the pump.

With such a unit, pH may be controlled without hunting and with a higher degree of uniformity than possible with a single pH control alone.

Air-Operated Systems

The automatic stroke length or speed adjustment required in instrumentation of chemical feed systems can also be available in air-operated controlled-volume pumps. These pumps may be operated by a variety of controls-mechanical, electronic or electric, pneumatic or hydraulic, to deliver a controlled volume of liquid.

Basic operation consists of air supply at correct pressure and sufficient volume flowing into a four-way air valve. This air valve alternately admits and exhausts air through cushioning valves to opposite ends of a double-acting air cylinder, to stroke the pump, as shown in Fig. 6.

Depending upon the nature of the installation, this basic operation can be modified in many ways, to suit specific needs. For example, the operation of the pump may be controlled by a hand or foot pedal so that the pump operates only when this pedal is depressed. Similarly, an electrical contact on a conveyor, or a push button, can be used to energize the system.

In a typical system, a water meter is mounted in the main-line flow and measures rate of flow. Nutation, or the rate of wobble, of the meter disk, in proportion to main-line flow rate, rotates a rotary air valve mounted on the water meter. This air valve is piped to the main air supply and to opposite sides of the pump's air cylinder. The pump strokes twice for each revolution of the rotary air valve. The number of strokes per minute depends upon the rate of nutation of the meter disk, which in turn is proportional to the rate of flow of fluid through the meter.

When the length of tubing from the rotary air valve to the air cylinder on the pump exceeds 20 ft., or for higher pump capacities, the main air supply is piped to a master four-way valve mounted on the base of the pump. A pilot air supply, passing through the rotary air valve, positions a piston within the master four-way air valve.

pH control system . . . In a typical pH control system, shown in Fig. 7 a rotary air valve mounted on the positive-displacement meter is used to pace the air-operated pump. In addition, the stroking length is varied automatically by an air-piston operator which receives a controlled air signal (3 to 15 psi.) from a pH pneumatic proportional controller.

With this arrangement, in addition to automatic adjustments in plunger stroke, stroking speed may vary in proportion to the main-line flow rate, thus compensating the system for variations in flow rate. The one controlled-volume pump serves as final control element for two meters, namely, the flow meter and the pH meter.

Automation . . . Complete automatic control, utilizing air-powered pumps as process flow-control instruments, is well illustrated by a recent installation of 23 pumps on a continuous polymerization process. These controlled-volume pumps were installed after a year of engineering study and plant testing.

In this process, various chemical streams are combined, homogenized, and then pumped to the reactor in proper proportions continuously, as

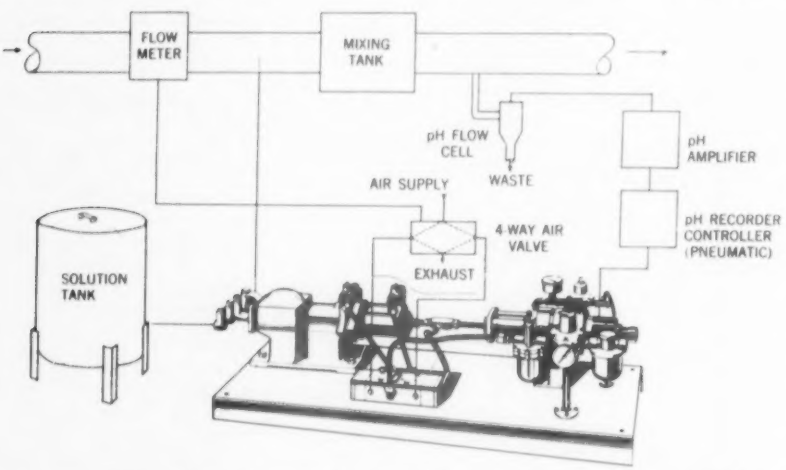


Fig. 7—Air-operated pH control system using rotary air valve to pace controlled-volume pump in proportion to flow, and air piston operator to control stroke length in response to signal from pneumatic pH recorder controller.

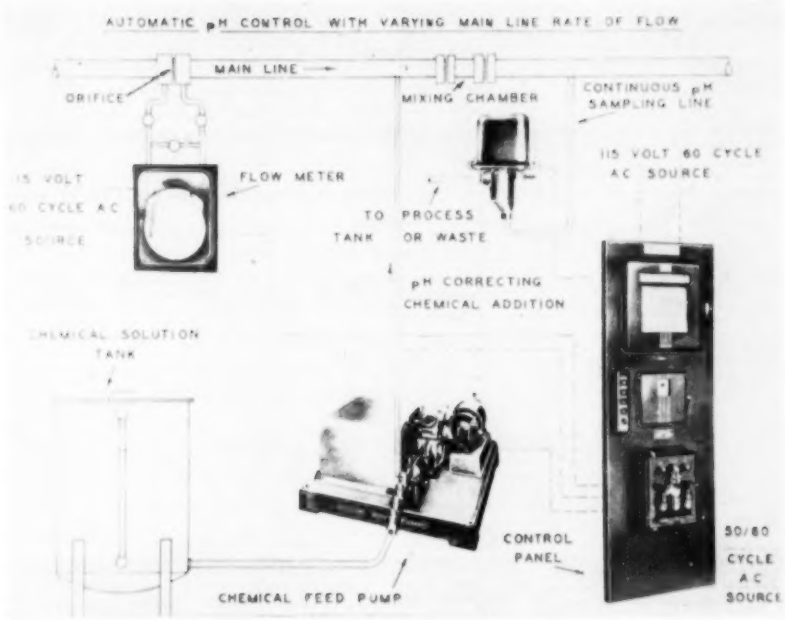


Fig. 8—Typical graphic panel used for centralized control and recording of operation of 23 controlled-volume pumps.

shown in Fig. 8. The over-all process accuracy is approximately .5 per cent. In addition to these exacting flow requirements, there are other conditions which have to be met. Some of these include:

1. Centralized control through one panel of all the process pumps widely separated in a four-story building.

2. A record, by a cumulative check on quantities pumped, of total daily production.

3. Monitoring the chemical stream pumps so that at any time a standby pump can be inserted in the line as a replacement without disturbing over-all flow of the chemical.

4. Additional independent and automatic controlled regulation of the catalyst pumps in accordance with the temperatures in the continuous reactor.

Pump operation . . . Here is how the 23 controlled-volume pumps and graphic panel installation satisfied all these requirements. Each pump, with the exception of four chemical pumps has its own cutoff valve. Process capacity is regulated by a large handwheel which adjusts the stroking rate for all of the controlled-volume pumps. The handwheel actually regulates a mechanical speed variator which, acting through a gear reducer, drives a camshaft, as shown in Fig. 9. All the pumps are actuated from this shaft by their own individual pilot air valves. Any pump can be cut out of the line.

Each pump is calibrated to deliver the exact amount of fluid required in the process when all pumps are operated at 30 s.p.m. But different capacities for any given requirement can be achieved by adjusting speed of the output shaft or the variator by means of the handwheel. The speed of the output shaft is indicated by a gage on the panel face, while the counter above this gage totals the actual revolutions of the camshaft.

Fig. 9—Interior detail of graphic panel showing handwheel control of mechanical speed variator which drives a camshaft. Pumps are actuated by pilot air valves permitting each pump to be removed from the line by cutting of its pilot signal at the panel.

The total daily production is easily checked by reading this tachometer counter. Since all pumps are controlled from this one camshaft, and since they are operated at a certain total process capacity, the total throughput can be calculated by multiplying camshaft revolutions by system capacity.

Chemical pumps . . . The four chemical stream pumps are furnished with a monitor system to indicate when any one of the pumps is functioning improperly. Normally, this is accomplished by using any flow-sensing element. However, the nature of the fluid handled in this particular application precludes the insertion of a flow-sensing element in the lines.

The pump monitoring system operates in the following manner: A limit switch on each pump trips and releases with each full stroking cycle. A delayed-action switch is set to allow a specific time delay between successive actuations of the limit switch. Each time that the limit switch makes contact, it resets the delayed-action switch. If the delayed-action switch is not reset before its allowable time limit, it starts the warning signal system. A howler sounds, and a light indicates on the face of the board the specific pump which is malfunctioning.

A timer, with a 1 to 3-minute range, switches the monitoring system, at specific intervals, from one pump to another to test all four pumps in turn with this single system.

After all these chemical streams have been properly blended, homogenized, and fed into the reactor, process control is effected through close control of temperature. Once the reaction has started, catalyst feed is very carefully controlled to maintain a proper temperature in the reactor and transmits a 3 to 15-psi. air signal to the pump, which acts as a final control element on catalyst slurry feed.

Actually, the instrument air signal (3 to 15 psi.) is transmitted to an air-piston operator mounted on the pump, which in turn sets the stroking length of the pump to deliver more or less catalyst, as required to maintain proper temperature control of the reactor.

References

1. Sheen, Robert T., Trans. A.I.Ch.E., 42, 725-39 (1946).
2. Sheen, Robert T., Power Plant Eng., 49, 86-91 (1945).
3. Sheen, Robert T., Ind. Eng. Chem., 39, 11, 1433-39 (1947).

№ 30 DAILY DRILLING REPORT — REPORT NO. — DATE

OPERATOR | LEASE | WELL NO. | FIELD OR DIST.

CONTRACTOR: **A. B. C. DRILLING CO.** | RIG NO. | DRILL PIPE STRING NO. SIZE | TOOL JOINT OD / TYPE THD.

OPERATOR'S REPRESENTATIVE | CONTRACTOR'S TOOL PUSHER

PUMPS

NO.	MANUFACTURER	TYPE	STROKE LENGTH
1.			
2.			
3.			

CASING & LINER RECORD — SIZE

TIME DISTRIBUTION—HOURS

	MORN	DAY	EVE
DRILLING ACTUAL			
REAMING			
CIRCULATING			
TRIPS			
DEVIATION SURVEY			
TEST B.O.P.			
CUT OFF DRILL LINE			
REPAIR RIG			
CORING			
WIRE LINE LOGGING			
OTHER			
FISHING			
COMPLETING (A) PERFORATING			
(B) RUNNING TUBING			
(C) SWABBING			
(D) TESTING			
(E) ACIDIZING			
(F) ADDITIONAL			

TIME SUMMARY (OFFICE USE ONLY)

CONTRACTOR'S TIME HRS:

OPERATOR'S TIME:

HRS. W/D.P:

HRS. WO/D.P:

HRS. STANDBY

WIRE LINE RECORD

REEL NO.

NO. OF LINES — SIZE

FEET SLIPPED

FEET CUT OFF

PRESENT LENGTH

TON MI. or TRIPS SINCE LAST CUT

CUMULATIVE TON MI. or TRIPS

NO. OF DAYS FROM SPUD

CUMULATIVE ROTATING HRS.

MORNING TOUR

NO.	DRILLING ASSEMBLY		BIT RECORD	
	STANDS DP	FT.	RUN NO.	
	SNGLS. DP	FT.	SIZE	
	D.C. ID		MFG.	
	OD	FT.	TYPE	
	RMR BODY OD	FT.	NO. NOZ.	
	STB BODY OD	FT.	SIZE	
	SUBS OD	FT.	SER. NO.	
	BIT OR C.B.	FT.	DEPTH OUT	
		FT.	CUMULATIVE HOURS RUN	
	KELLY DOWN	FT.	COND. OF BIT	
	TOTAL	FT.	REAMER CUTTER NO.	
WT. OF STRING		LBS.	TYPE	

DRILLER

HRS. DRLD.	CORE NO.	FROM	TO	FORMATION (SHOW CORE RECOVERY)	RC I R.

DEVIATION RECORD:	DEPTH	DEV.	DIRECTION	DEPTH	DEV.

REMARKS

DAY TOUR

NO.	DRILLING ASSEMBLY		BIT RECORD	
	STANDS DP	FT.	RUN NO.	
	SNGLS DP	FT.	SIZE	
	D.C. ID		MFG.	
	OD	FT.	TYPE	
	RMR BODY OD	FT.	NO. NOZ.	
	STB BODY OD	FT.	SIZE	
	SUBS OD	FT.	SER. NO.	
	BIT OR C.B.	FT.	DEPTH OUT	
		FT.	CUMULATIVE HOURS RUN	
	KELLY DOWN	FT.	COND. OF BIT	
	TOTAL	FT.	REAMER CUTTER NO.	
WT. OF STRING		LBS.	TYPE	

DRILLER

HRS. DRLD.	CORE NO.	FROM	TO	FORMATION (SHOW CORE RECOVERY)	RC I R.

DEVIATION RECORD:	DEPTH	DEV.	DIRECTION	DEPTH	DEV.

REMARKS

EVENING TOUR

NO.	DRILLING ASSEMBLY		BIT RECORD	
	STANDS DP	FT.	RUN NO.	
	SNGLS. DP	FT.	SIZE	
	D.C. ID		MFG.	
	OD	FT.	TYPE	
	RMR BODY OD	FT.	NO. NOZ.	
	STB. BODY OD	FT.	SIZE	
	SUBS OD	FT.	SER. NO.	
	BIT OR C.B.	FT.	DEPTH OUT	
		FT.	CUMULATIVE HOURS RUN	
	KELLYDOWN	FT.	COND. OF BIT	
	TOTAL	FT.	REAMER CUTTER NO.	
WT. OF STRING		LBS.	TYPE	

DRILLER

HRS. DRLD.	CORE NO.	FROM	TO	FORMATION (SHOW CORE RECOVERY)	RC I R.

DEVIATION RECORD:	DEPTH	DEV.	DIRECTION	DEPTH	DEV.

REMARKS

New A.A.O.D.C. Drilling Report Saves Time and Gives More Information

by Ed McGhee
District Editor, Drilling and Production

COUNTY | STATE

WT. & GR.	DEPTH SET FROM	DEPTH SET TO	PERFORATIONS FROM	PERFORATIONS TO	CEMENT USED	OTHER

DRILLING CREW PAYROLL DATA

No. 30 DATE

WELL NAME & NO.

COMPANY

TOOL PUSHER RIG NO.

TA-Y A.M.	WT. ON BIT 1000 #	PUMP PRESS.	PUMP NO. 1 LINER SIZE	PUMP NO. 1 S.P.M.	PUMP NO. 2 LINER SIZE	PUMP NO. 2 S.P.M.	METHOD PUMPS RUN

DIRECTION	DEPTH	DEV.	DIRECTION

MUD RECORD

TIME				
WEIGHT				
VISC.				
W.L.-C.C.				
FLTR. CK.				
PH				
SD. CONT.				

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

MORNING TOUR P.M. A.M.

CREW	SOC. SEC. NO.	NAME	HRS.		
DRILLER					
DRKMAN					
MTRMAN					
FIREMAN					
FLRMAN					
FLRMAN					
FLRMAN					

TA-Y A.M.	WT. ON BIT 1000 #	PUMP PRESS.	PUMP NO. 1 LINER SIZE	PUMP NO. 1 S.P.M.	PUMP NO. 2 LINER SIZE	PUMP NO. 2 S.P.M.	METHOD PUMPS RUN

DIRECTION	DEPTH	DEV.	DIRECTION

MUD RECORD

TIME				
WEIGHT				
VISC.				
W.L.-C.C.				
FLTR. CK.				
PH				
SD. CONT.				

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

DAY TOUR A.M. P.M.

CREW	SOC. SEC. NO.	NAME	HRS.		
DRILLER					
DRKMAN					
MTRMAN					
FIREMAN					
FLRMAN					
FLRMAN					
FLRMAN					

TA-Y A.M.	WT. ON BIT 1000 #	PUMP PRESS.	PUMP NO. 1 LINER SIZE	PUMP NO. 1 S.P.M.	PUMP NO. 2 LINER SIZE	PUMP NO. 2 S.P.M.	METHOD PUMPS RUN

DIRECTION	DEPTH	DEV.	DIRECTION

MUD RECORD

TIME				
WEIGHT				
VISC.				
W.L.-C.C.				
FLTR. CK.				
PH				
SD. CONT.				

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

EVENING TOUR P.M. P.M.

CREW	SOC. SEC. NO.	NAME	HRS.		
DRILLER					
DRKMAN					
MTRMAN					
FIREMAN					
FLRMAN					
FLRMAN					
FLRMAN					

A NEW standard drilling report has been prepared which should give the drilling contractor a better check on what he is getting out of his rig. Developed by a subcommittee of the American Association of Oilwell Drilling Contractors, the Standard Daily Drilling Report Form has the tentative approval of the A.A.O.D.C. and the A.P.I. General Committee, Division of Production.

Designed primarily for future analysis of rig operation, the new form will have these benefits for both company and contractor:

- **Save time** for the driller because he will have one, instead of two forms to fill out.
- **Eliminate controversies** in accounting between the company and the contractor caused by errors made when filling out two different drilling reports.
- **Insure completeness and accuracy** because all drillers will become familiar with only the one standardized form, regardless of the company or contractor for whom he is working.
- **Provide adequate information** for an

analysis of daily drilling operations by mangament.

In the past, several industry committees have endeavored to get information to evaluate local drill-pipe performance, bit performance, time analyses, hydraulics, etc. Assembling the information was impossible because of the inadequate information furnished by old-style reports.

The subcommittee, after studying the multitude of different daily drilling-report forms presently in use, selected the best characteristics of the old forms and compiled them into one.

The size of the report proper (14 by 17 in.) was selected in order to permit folding one time and filing in a legal size folder.

Because in some areas it is required that the daily time report be incorporated with the daily drilling report, the time report is attached to the drilling report; the form is perforated so that the time report can be torn off and mailed separately.

Instructions to the Driller

To insure the proper completion of the new form, an instruction paper has been prepared for the driller. The following is taken from those instructions.

The daily drilling report is one of the most important sources of information in the oil industry. From it engineering reports are compiled showing such information as penetration rates, cost of rig operations, depth-measurement details, well-completion records, and equipment-performance data.

The daily drilling report is also a legal document since it is a record signed by the driller and tool pusher showing the contractor's compliance with the terms of the drilling contract and state laws controlling drilling practices. It is also an accounting document from which the contractor prepares his invoice to the operator.

It is highly important that the driller prepare this report accurately and completely.

Heading . . . All of the items in the heading should be filled out completely each day. The casing record which appears in the heading should be filled out daily showing the last string of casing that has been run. This will enable responsible personnel on the rig to know the minimum inside diameter of the casing being worked through as well as the depth set.

In the section of "Casing and Liner Record" captioned "Other," the cementing details with the time plug hits bottom may be shown. Also information concerning centralizers and scratchers which may have been installed should be noted here.

Space has been provided in the heading for the signature of both the contractor's tool pusher and the operator's representative. These signatures will certify that the information placed on the drilling report is accurate and complete.

Information on pumps is necessary for the contractor and operator to know the horse power and capacity of the pumps being operated, and the length of stroke necessary for volume calculations and analysis of drilling operations.

The information on drill pipe and tool joints is needed in order that a proper service record can be maintained, as well as furnish information needed to calculate pressure losses in the drill pipe.

Drilling assembly . . . Space is provided for the number and length, as well as other important information on all the tools being run in the hole. Each driller must show the complete drilling string in use at the end of his tour, whether in or out of the hole. In cases where rental tools and rental drill pipe are involved, information for billing is taken from this section.

When fishing operations are in progress, the top and bottom of the fish should be shown in the "Remarks" space to supplement the fishing assembly information that is to be shown in this space. One blank space is provided for any additional tool or tools that may be run in the hole.

Bit record . . . Under "Type Bit," show the manufacturers cone type and designate whether it is a regular or jet-type bit by using the letters "R" or "J." Listing the number and size of nozzles in the bit in the space provided permits calculations to be made which will determine the required pump pressure for optimum bit performance.

Information on condition of the bit pulled will enable the tool pusher or superintendent to make decisions on the type bit to be used for future drilling, as well as the maximum time it can stay in the hole.

The number carried for reamer cutters is to be the cumulative number of reamer cutters that have been used.

Drilling information . . . All information listed in this section is essential for analysis of the drilling operation. A large number of rigs today run pumps in parallel (two pumps on the hole simultaneously) or two pumps in series (commonly called compounding). This is to be shown under the column "Method Pumps Run" by using "S"-single, "P"-Parallel, and "C"-compound.

In addition to the information shown on the "Depth and Formations Penetrated," this space is to be used to show coring information. In addition, to showing the footage cut, the length of core recovered must be shown in the "Formation" column. The core head number will have been shown in the "Bit Record" space.

Deviation record . . . This information is important as it shows compliance with contract terms and state regulations. This record, properly kept, may also call attention to hazardous hole conditions which may exiist.

Mud record . . . In addition to the usual information on mud characteristics that are shown two blank spaces are provided for additional information that may be required on some types of mud.

Mud and chemicals added . . . Show the type and amount of the various mud additives and chemicals used. This information is needed by both operator and contractor.

Remarks . . . This space should be used to show the sequence of operations and time required for each operation, making sure that total time agrees with that shown in the "Time Distribution" section.

Driller's signature . . . The driller will sign in the space provided on his tour and will be held responsible for the accuracy and completeness of the information.

Time Distribution

Drilling—Actual time drilling on bottom.

Reaming—List time reaming and show in remarks depth and reason reaming occurred.

Circulating—List time circulated and show in remarks the reason for circulating.

Trips—Show time on trips and show in remarks the reason the trips were made, and also any trouble encountered.

Deviation survey—Show time required here, and place data in "Deviation Survey" space of report.

Test blowout preventers—Show time required here and show in remarks the actual test performed with results.

Cut off drill line—Show time required here and show in remarks the amount cut and other information required.

Repairing rig—This is to show only

(Continued on page 150)

How to Stop Troublesome Pulsation Without Excess Pressure Drop

by Clarence N. Taylor

Part 2 (Conclusion)

ACTUAL field tests have failed to confirm the low power-transmission ratios that are theoretically possible in regions of attenuation, according to Equation 2. (See last week's issue.) The tests do show good agreement with the theory pertaining to the transmission of sound waves in a pipe, with a change in area in the conduit. (Equation 3.) This theory can best be explained by examination of Fig. 6. (See last week's issue.)

Note that five different areas are encountered by the wave in passing through the dampener. Now consider only the two volume chambers and the interconnecting tube, areas S_1, S_2, and S_3. It is assumed that the areas S_4 and S_5 extend indefinitely in each direction and are constant. The transmitted wave must encounter these different areas as it passes through the dampener. Area S_2 is the smallest of the three areas shown. However, the same theory applies if S_2 is the largest area.

It is important to note that the areas S_4 and S_5 do not have to be equal. However, the best method of matching impedances is to have areas S_2, S_4, and S_5 equal. It is sometimes necessary to use different areas and the equations presented must be adjusted accordingly. The power-transmission ratio, based on area theory, is expressed in terms of the ratios of areas. Thus, the ratio of the average energy of the transmitted wave at the outlet of the dampener to the average energy of the incident wave at the inlet of the dampener may be expressed as:

$$P_r = \frac{4\,(S_3/S_1)}{(S_3/S_1 + 1)^2\,\mathrm{Cos}^2\,(720fL/c) + (S_2/S_1 + S_3/S_2)^2\,\sin^2\,(720fL/c)} \qquad (3)$$

Author is associated with Gulf Interstate Gas Co.'s engineering department, Houston.

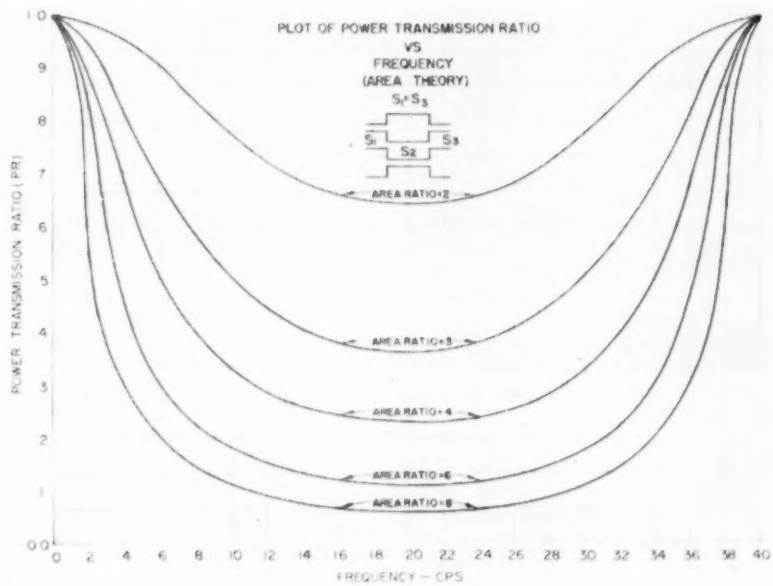
Limitations . . . A careful study of this equation will reveal several important limitations to its validity. The first of these may be expressed simply that when the angle (720fL/c) in degrees, is very small the transmission is essentially independent of the flow areas of the dampener. As this angle becomes large, the transmission is controlled by the flow areas encountered. The second, is that when the sine of the angle is either plus or minus one, then the power-transmission ratio is dependent only on the ratios of areas.

$$P_r = \frac{4\,(S_3/S_1)}{(S_2/S_1 + S_3/S_2)^2} \qquad (4)$$

The ratio may reach a value indicating full transmission when the flow area of the interconnecting tube is the geometrical mean of the flow areas of the volume chambers. The third limitation occurs when the sine of the angle is equal to zero. Here the power-transmission ratio becomes:

$$P_r = \frac{4\,(S_3/S_1)}{(S_3/S_1 + 1)^2} \qquad (5)$$

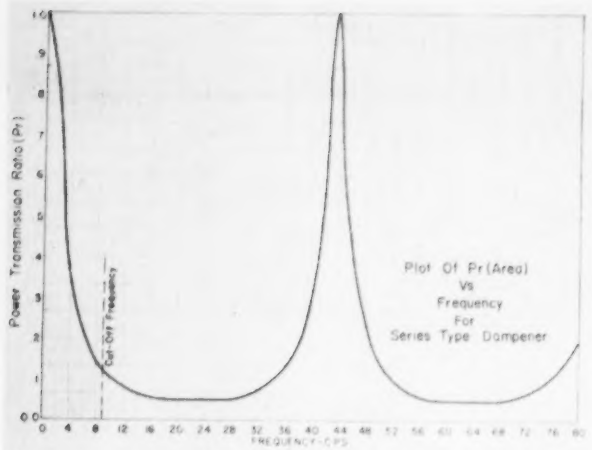
Once again, the ratio may attain a value indicating full transmission when the flow areas of the volume chambers are equal. Note the agreement with the Cos W. In addition, Equation 3 is not applicable whenever the wave length of sound becomes small in comparison to the flow area or any dimension of the dampener. These major limitations to the use of Equation 3 are important. A plot of Equation 3 for a constant length of the interconnecting tube and various ratios of the flow areas is shown in Fig. 10. The power-transmission ratio is shown in Fig. 11 for the dampener in Fig. 3.



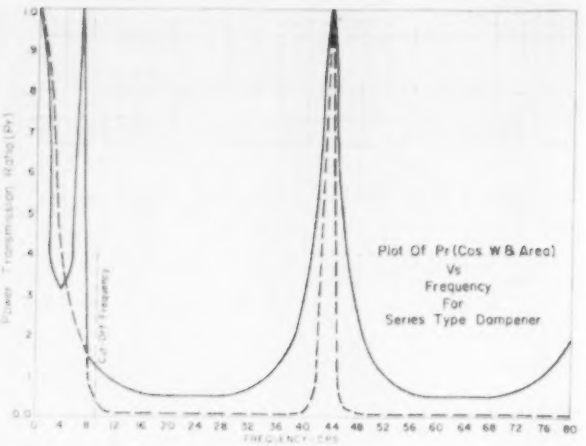
POWER-TRANSMISSION RATIO variation with frequency, plotted at five area ratios. Fig. 10.

Conclusion . . . A very important conclusion can be easily made. The greater the ratio of the flow areas of the volume chambers to the flow area of the interconnecting tube, the smaller the power-transmission ratio and, therefore, the greater the attenuation. Yet Equation 3 is not applicable when this ratio of areas becomes extremely large since the waves are not actually confined within the pipe, but behave as though they were in their own unconfined medium.

There are two ways to obtain a small ratio. First, by holding the flow area of the interconnecting tube to the smallest value as indicated by the optimum pipe size for the rate of flow, and



POWER-TRANSMISSION RATIO variation with frequency, plotted for series-type dampener. Fig. 11.



COMPOSITE TRANSMISSION CURVE for series-type dampener. Fig. 12.

then to increase the diameter of the volume chambers. There is, however, an economical limit to which this diameter may go.

The other method of obtaining a larger ratio of areas is to set the diameter of the volume chamber at some desired limit and then decrease the diameter of the interconnecting tube. This is limited by the pressure drop which is acceptable. The best ratio must be selected only after due consideration of the cost of the volume chambers versus the maximum pressure drop that can be accepted. The dampeners to be installed in Gulf Interstate Gas Co.'s compressor stations will have a ratio of approximately 8.

This was established as a result of an economic study of the initial first cost compared to the operational cost of introducing a pressure drop over and above the normal drop to be expected from a conventional station piping arrangement.

Band location . . . It should be pointed out in Figs. 8, 9, 10, and 11 that the location of the first pass band is dependent on the length of the interconnecting tube. This location is determined by the fundamental resonant frequency of this tube when it is considered to be a tube open on both ends. This frequency is found by:

$$f_r = c/2L \qquad (6a)$$

Note that for a given velocity of sound the longer the tube the lower the resonant frequency; the shorter the tube the higher the resonant frequency. A good design would also consider the location of at least the second pass band. This resonant frequency is found from Equation 6b. If the tube is considered to be closed on one end, the fundamental resonant frequency may be found by Equation 7.

$$f_r = c/L \qquad (6b)$$

$$f_r = c/4L \qquad (7)$$

A comparison of the transmission curves in Figs. 9 and 11 reveals a decided difference. The most important is the shape of the curve in the regions of very low frequencies (when the angles are small). Field tests have proved that the dip in the curve in Fig. 9 exists, as well as the general shape of the curve in the regions of these low frequencies. The curve in Fig. 11 does not show this dip nor the succeeding transmission peak. Rather, it gradually falls from full transmission at a steady rate to its minimum value.

The limitations imposed upon this curve and its equations state this fact to be true, so long as the angle is small. Once the angle or its function begins to assume control in the equation, the curve assumes a shape that has been found, by test, to be in agreement with actually measured values. If two transmission curves are superimposed, a comparison can be made.

Composite curve . . . In Fig. 12 the composite transmission curve that most closely follows experimental data is shown by the solid line. Note the fact that when the indicator, Cos W, Fig. 8, has a value of zero, we can expect full transmission. This follows since the region of frequencies for which we must expect high transmission or little attenuation occurs when the indicator has values between ± 1.

The shapes of the two transmission curves about those frequencies of the first pass band, as well as the second pass band, are significant. One is relatively broad while the other is relatively narrow. Since this exact shape is not known, the designer would do well to minimize the importance of the pass bands by using such lengths for the interconnecting tube that the locations of the bands are above the harmonics previously mentioned.

This is a good rule to follow since this represents the principal danger point in the design. Experience in the industry to date has been that while this represents a dangerous condition, the foregoing rule is a good one to follow but does not guarantee a safe design for resonant piping conditions. If the cutoff frequency as shown by the indicator, Cos W, is rigidly adhered to, a small, but important, safety factor will be realized. This is shown by the fact that the transmission curves "lead" the Cos W cutoff frequency.

The best attenuation or the smallest power-transmission ratio that can be expected from these curves will be the lowest ratio that is assumed by the transmission curve based on the area theory, and it will occur at that frequency corresponding to this ratio. In considering various critical points in the design the disturbing frequency called "beat frequency" must be considered.

While it is not possible to eliminate this condition, it is possible to locate it so that it will be relatively harmless. A beat frequency is the resulting frequency of two primary waves whose difference in frequencies is small in comparison to the individual frequencies. Whether or not the beat frequency, or any other frequency, is in the audible range of the human ear is not important. They may still exist in the medium and with suitable instrumentation may be identified.

The importance of the beat frequency is that it must not coincide with either the base frequency or the compressor or any harmonic of that frequency. In addition to the beat frequency, the

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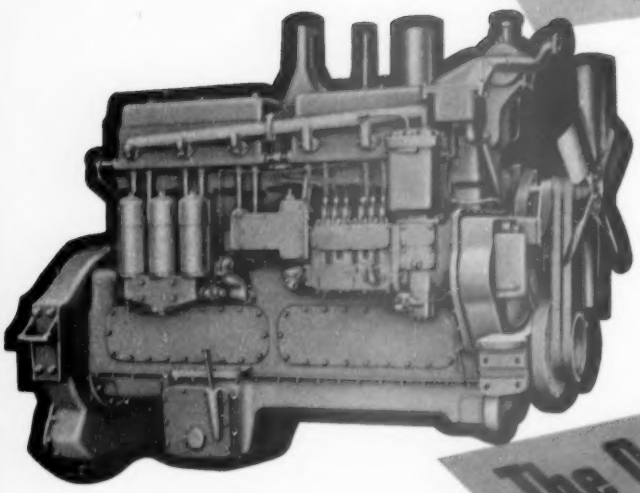

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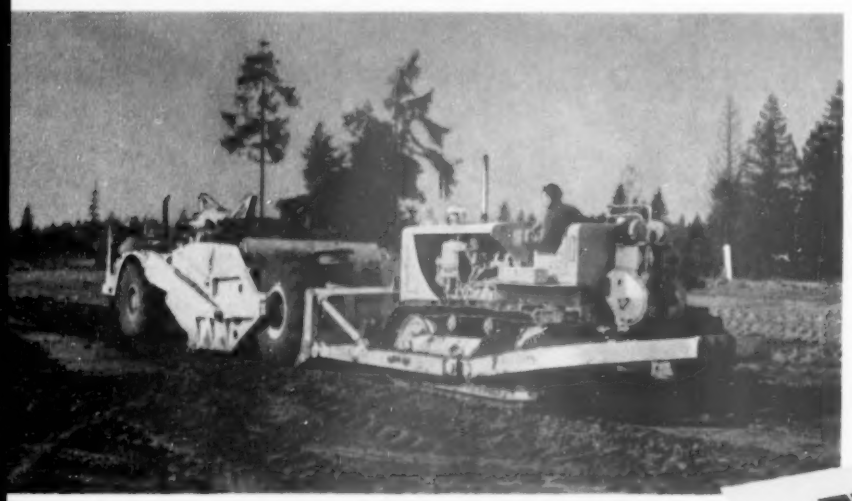

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resonant condition of all risers connected to the piping must be investigated; particularly, the run of pipe from the compressor flange to the dampener. That pipe must be so arranged that its resonant condition does not equal the base frequency or a harmonic.

While this will not adversely affect the operation or performance of the dampener, it will definitely affect the operation of the compressor. This harmful condition has been found to exist in several stations of different companies. These conditions can be determined approximately by the use of the rather simple Equations 6 and 7.

Dampener size . . . The size of the dampener, as to volumes and tube lengths to be used, can be easily found. It is important to remember that the dampener consists of two (essentially) equal sections; therefore, the volume and tube length selected are for one section only. For a given volume, there are a multitude of tube lengths that in combination with the volume chamber will have a multitude of cutoff frequencies, as defined by the use of the indicator Cos W.

The cutoff frequency is determined from the base frequency. A study of the location of the first and second pass bands, in relation to the base frequency and its harmonics, will usually determine the general tube length to be used. If these two variables can be determined, the third variable, the volume, can be found from Equation 8:

$$f_c = c/\pi\,(S/LV)^{1/2} \qquad (8)$$

Frequency calculations . . . When these quantities have been determined, the next step consists of calculating for a range of frequencies, the values of the Cos W, and both power-transmission ratios. It is usually necessary to plot the three curves so that the entire picture can be studied as a whole. Several short cuts will be readily apparent as the calculations proceed. It may be necessary to repeat these calculations several times since the first selection may not prove to be the most desirable combination. It may prove helpful in the initial selections of volumes, tube lengths, and cutoff frequencies to construct a chart relating these variables.

A close study of Equation 8 makes apparent several important facts. The first of these is rather striking. For a given length of the interconnecting tube, the more restriction and, therefore, the smaller the flow area in the interconnecting tube, the smaller the volume required to effect the same cutoff frequency. If the length and diameter of the interconnecting tube are held fixed and the cutoff frequency varied, note the startling effect in the volume necessary to meet a given cutoff frequency.

The lower the cutoff frequency the larger the volume chamber must be. Since a ratio of areas has been assumed, the length of the chamber must become greater as the volume increases. This can reach proportions which are prohibitive for use in certain locations. Thus, for an economical design, it is important to select a cutoff frequency that will give the smallest possible volume chambers.

To maintain the most economical volume chamber, two courses are open for investigation; vary the tube length or the tube flow area. Herein lies the economical study previously mentioned, since reducing the flow area of the tube means increasing pressure drop across the dampener. Increasing the tube length also means that the pass bands will occur at lower frequencies. Thus, there are numerous combinations of the variables.

The equations presented to design a series-type dampener, although rather elementary, have been found to give surprising results as shown in Fig. 5. (See last week's issue.) While they are technically correct, they do not represent the most advanced theory. Work is progressing throughout the industry to seek a more refined and precise method of design based on more advanced theory. However, it must be stated that, while the precise method is desirable, the dampeners based on the present method are practical in design and are fully capable to giving a performance that leaves little to be desired.

Other applications . . . Although the dampeners discussed herein are to be installed in the station piping, other applications are possible. Dampeners designed by this concept would serve as excellent mufflers for engines, or with suitable cleaning elements installed, would be superior air-intake silencers. Perhaps the best location for the installation of the dampener would be in a meter run.

This would be an almost perfect application of the theory and the best possible results could be expected in that location. This may be the most important application for many companies which have serious trouble with pulsations affecting meter readings. In fact, any location where pulsating effects are encountered is suitable for the installation of a dampener.

Vibration eliminated . . . The installation of effective pulsation dampeners eliminates the vast majority of vibration problems, so commonly found in compressor-station yard piping. Yet it must be noted that while the dampener described is effective in reducing pulsations in the gas stream, it is not effective for all frequencies. As previously pointed out, the very low frequencies below the cutoff frequency and those higher periodic frequencies falling in the pass bands, are passed by the dampener.

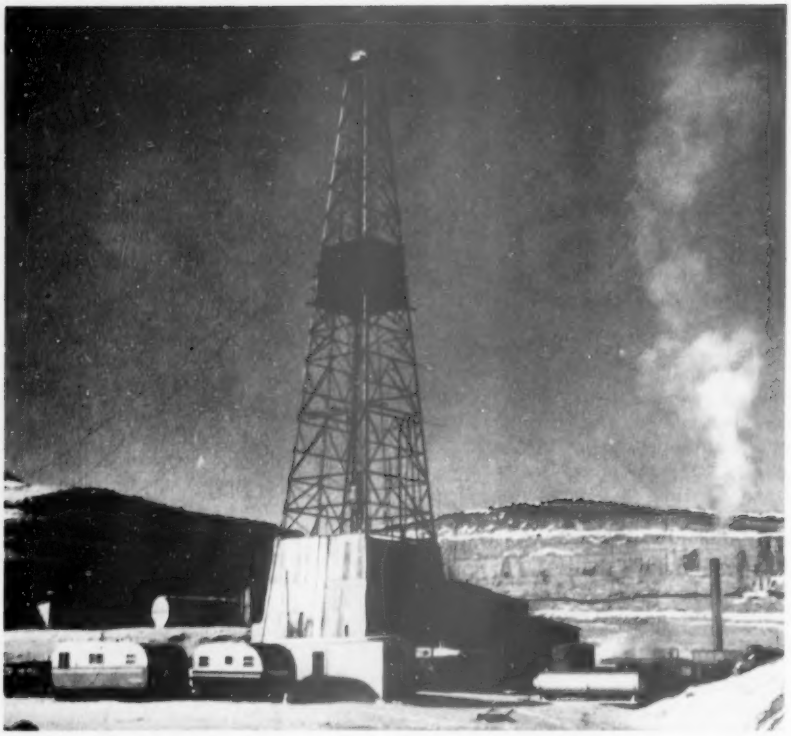
It should be noted that field tests have substantiated the existence of the pass bands; however, considerable dampening occurred for these frequencies. The best design of the over-all piping arrangement would consider these few frequencies as a possible source of unbalanced forces that could cause serious pipe vibrations. In addition to these forces in the gas stream, other forces are present that result from the operation of the large reciprocating-type engine and compressor units used widely in the industry.

These partly balanced and some completely unbalanced forces are almost inherent with the type of unit. The effects of these forces on the piping system should be investigated.

(Continued on page 150)

Glossary of Terms

- c = velocity of sound in feet per second for a compressible fluid = $(g_c kRT)^{1/2}$
- Cos W = indicator of attenuation
- f = frequency in cycles per second
- f_b = base frequency of compressor
- f_c = cutoff frequency, defined by Cos W
- f_r = resonant frequency
- g_c = dimensional constant $= 32.17 \left(\frac{\text{Lb}_m \text{ per ft.}}{\text{Lb}_f \text{ per sec.}^2} \right)$
- k = ratio of heat capacities
- l = length in feet
- L = distance between volume chambers in series type dampener
- m = ratio of areas
- P_r = power - transmission ratio (based on area theory)
- P_r = power - transmission ratio (based on Cos W)
- R = specific gas constant in $\left(\frac{\text{Ft. per Lb}_f}{\text{Lb}_m \text{ per } ^\circ\text{R.}} \right)$
- S = flow area in square feet
- T = absolute temperature in degrees Rankine
- V = volume of volume chamber in cubic feet



DERRICK JOB is typified by this Loffland Brothers rig working for Gulf Oil Corp. at 1 Government-Dorough, C NE SW 24-143n-103w, Golden Valley County, North Dakota, now drilling below 13,203 ft. in Ordovician Red River rocks.

WINTER DRILLING IN THE WILLISTON BASIN

RIG and derrick winterizing, boiler installations to provide steam heat for crew comfort, and totally enclosed steel mud pits are some measures taken by contractors operating in the Williston basin. Winters there are severe and temperatures drop to as low as −45° F.

Rig winterizing . . . Contractors enclose derrick for first three girts for winter drilling. Also two girts are covered around fourble board on derrick, and a single girt on masts.

Steam lines are laid in same ditch as are water lines and both lines are covered to a depth of 1 ft. Water well drilled behind rig is located so water source will lie within confines of boiler room to prevent well water from freezing.

Bore-hole program . . . In current exploratory drilling in the southern part of the Williston basin, a number of tests are being drilled to depths of about 12,500 ft. in search of Mississippian, Devonian, Silurian, and Cambrian objectives. Shown on this page are photographs of three wildcats drilling in Golden Valley County, North Dakota, and Wibaux County, Montana. Contractors include Loffland Brothers Co., Tulsa; Roden & McRae, Denver; and Lowell Drilling Co., Denver.

Surface hole is cut with a 15-in. bit and reamed to 17¼-in. to a depth of 600 ft. where 13⅜-in. pipe is set and cemented with 600 sacks. Shoe is drilled under surface pipe with 13⅜-in. bit and protection hole cut to depths ranging from 8,600 to 9,200 ft.; in this range, 7⅝-in. protection pipe is set and cemented with 300 sacks.

Long hole is cut with 6¼-in. bit to lower Paleozoic objectives. Coring, started in Big Snowy (Mississippian) group is interspersed with drill-stem testing.

MAST JOB of Roden & McRae, drilling below 11,242 ft. for Blackwood & Nichols, 1 M. E. Gilman & Lang, C NE SE 15-140n-105w, 4 miles east of Beach, Golden Valley County.

ANOTHER MAST JOB is this rig drilling below 10,973 ft. for Lion Oil Co. at 1 Knight, C SW NW 29-14n-60e, 3 miles southeast of Wibaux, Wibaux County, eastern Montana.

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SHARPSHOOTING THIN ZONES MADE PRACTICAL BY "PIN POINT" ACCURACY OF McCULLOUGH RADIATION WELL LOGGER

Exact measurement and definition of any potentially productive interval, thick or thin, assures "putting the shots where they count" for greater production—more oil!

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RADIATION WELL LOGGER
with SCINTILLOMETER (GAMMA RAY AND NEUTRON LOGS)

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The well completed was in an old field where the zones are very thin and many of the sands produce 100% water. An error of a very few feet in measurements means the difference between success or failure. Ran the McCullough Radiation Well Logger with Scintillometer and simultaneously recorded a collar log. Collar locations checked within 6" at 3600'.

Shot four ½" burrless holes in five feet of shale for W. S. O. On bailing test, there was no fluid rise in 19 hours. Proceeded with production perforating of 200 plus holes with a 4¼" McCullough M-3 Burrless Bullet Perforator in the zones indicated by the log between 3633' and 3770'. There was a 400' fluid rise by the time the last M-3 Gun was fired. The well was completed as a good commercial producer.

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3. More detail in log.
4. Faster logging speeds possible.
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8. All controls at the surface.
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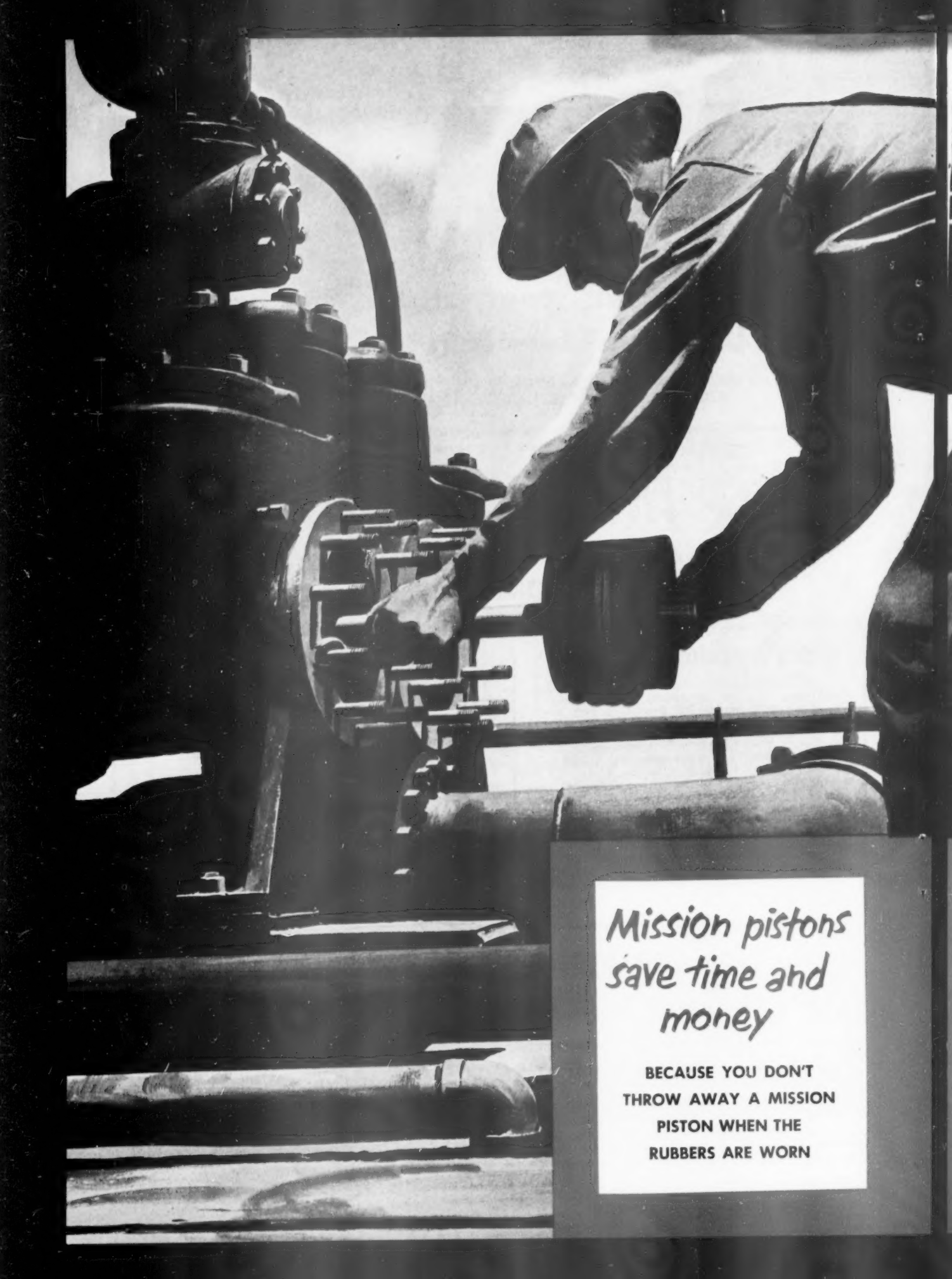
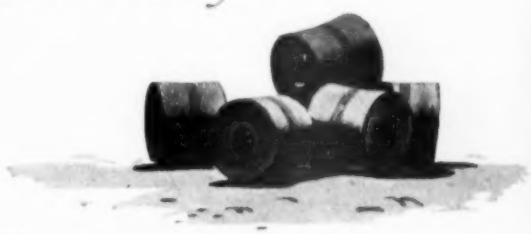

Mission pistons save time and money
BECAUSE YOU DON'T THROW AWAY A MISSION PISTON WHEN THE RUBBERS ARE WORN

Why there are Fewer piston bodies in the "graveyard" today



Before Mission pioneered this long-life mud pump piston with replaceable rubbers, slush pits and oil field "graveyards" everywhere had thousands of dollars worth of good piston bodies just rusting away. The rubbers had worn so the entire piston . . . body, rubbers and all . . . was worthless.

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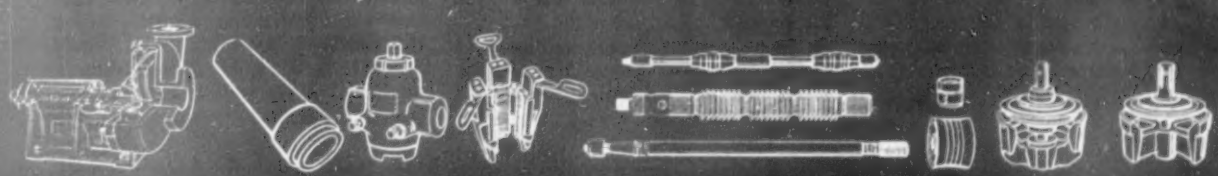

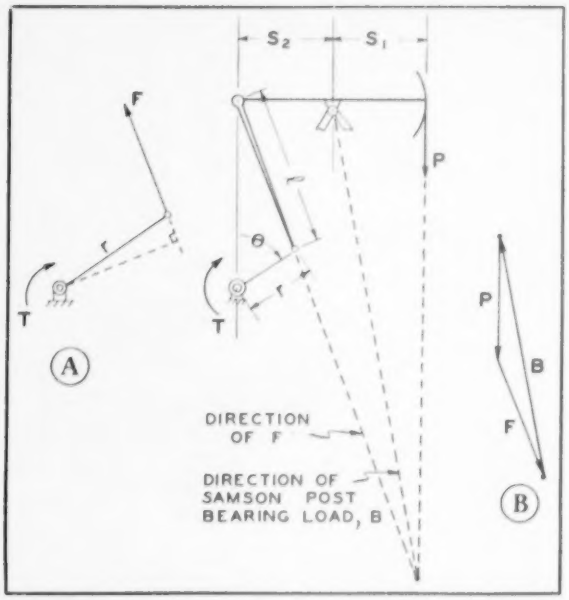

Fig. 1—From a dynamometer determination of P, the well load, the tensile force, F, in the pitman may be found.

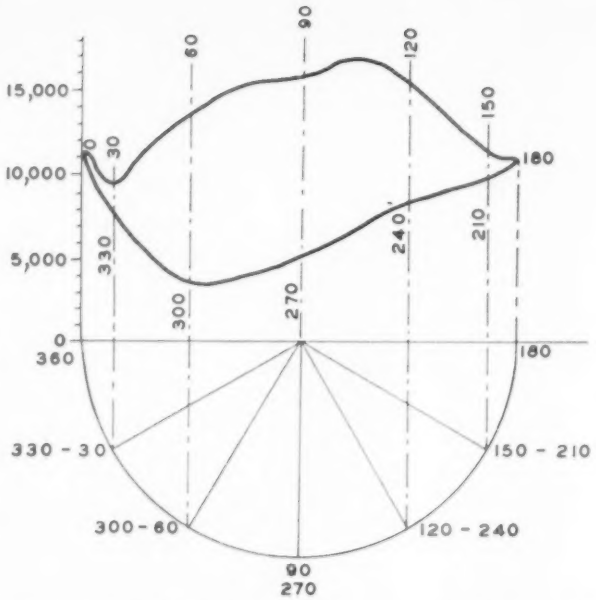

Fig. 2—A semicircle projected onto the dynamometer card shows the relation of the well load to the crank angle.

What Will Dynamometer Cards Tell You?—3

PUMPING-UNIT TORQUE CALCULATIONS

by Emory N. Kemler

PERHAPS the most important and the simplest general application of dynamometer cards is to the making of torque calculations. The only two dynamometer loads needed are the well load and the counterbalance weight. With that information and with charts presented in this article, reliable torque calculations can be made easily.

Why torque calculations? . . . The torque is the basic factor which determines the size of beam-pumping surface transmission equipment: the engine size, the belt size, and the reducer size. There is no other factor that so critically controls the size of the equipment. It is likewise important in equipment performance, hence in keeping maintenance to a minimum.

Doesn't horsepower determine engine size? . . . Torque is a better basis for the sizing of an engine than horsepower. Horsepower is proportional to the product of speed and torque, but the engine's torque output is essentially constant over a considerable speed range. In stating horsepower it is necessary to specify the speed at which the horsepower can be obtained.

Author is professor of mechanical engineering, University of Minnesota.

For a given pumping speed, the engine speed is determined by the speed ratio of the pulleys and reduction unit. The rated engine horsepower must therefore always be reduced to that which it will have at the pumping speed. With this qualification horsepower can be used, but torque output, being essentially constant, applies over a range of speeds and gives a safer basis of comparison.

The relation between torque, speed, and horsepower is given by:

$$T = 63{,}000 \frac{HP}{N} \qquad (1)$$

where:

T = torque in in.-lb.
HP = horsepower
N = speed in r.p.m.

Is reducer size specified by horsepower? . . . For the same reason given for engines, the torque is the basic factor to use in determining and selecting reducer size. The torque which a reducer will safely handle is essentially constant over the normal range of pumping speeds. The A.P.I. standards 11E recognize the torque as being easier to specify and to be less confusing, hence rate reduction units on the basis of torque only.

Is torque at peak load sufficient to determine reducer size? . . . The peak torque or the torque which determines the reducer size may occur at any instant over a considerable proportion of either the upstroke or the downstroke. Whether or not the peak load is the important one, depends on when it occurs in the cycle, its magnitude relative to the load in other parts of the stroke, and on the amount of counterbalance. It is only by making a complete torque analysis over the complete pumping cycle that the peak torque which the reducer must carry can be reliably determined.

Does peak load have any influence on reducer size? . . . The peak load as such needs to be considered only in connection with the overhung load capacity of the reducer crankshaft. A.P.I. standards 11E require the manufacturer to provide an overhung load capacity comparable to the peak torque capacity at

TABLE 1—C_1 VALUES

	L / r				
Θ	2½	3	3½	4	Sin Θ
0	0	0	0	0	0
15-345	0.359	0.342	0.330	0.321	0.2588
30-330	0.677	0.646	0.625	0.609	0.5000
45-315	0.916	0.879	0.853	0.834	0.7071
60-305	1.050	1.017	0.994	0.977	0.8660
75-285	1.074	1.054	1.040	1.030	0.9659
90-270	1.000	1.000	1.000	1.000	1.0000
105-255	0.858	0.878	0.892	0.902	0.9659
120-240	0.681	0.715	0.738	0.755	0.8660
135-225	0.499	0.536	0.561	0.580	0.7071
150-210	0.323	0.354	0.375	0.391	0.5000
165-195	0.158	0.175	0.187	0.196	0.2588
180	0	0	0	0	0

TABLE 2—C_2 VALUES

	L / r			
Θ	2½	3	3½	4
0	0	0	0	0
15-345	0.024	0.023	0.022	0.021
30-330	0.092	0.088	0.085	0.083
45-315	0.197	0.189	0.183	0.178
60-300	0.327	0.314	0.304	0.297
75-285	0.468	0.450	0.439	0.430
90-270	0.604	0.587	0.573	0.564
105-255	0.726	0.709	0.697	0.689
120-240	0.827	0.814	0.804	0.797
135-225	0.905	0.896	0.890	0.885
150-210	0.958	0.954	0.951	0.949
165-195	0.990	0.989	0.988	0.987
180	1.000	1.000	1.000	1.000

the various crank lengths. Peak load does indirectly impose minimum crankshaft size and bearing area, but for twin crank units, the shaft and bearing capacity is usually much greater than that imposed by torque considerations. When reducers are used for special applications that may require single-crank operation at full-torque capacity, the load capacity may need to be checked.

Can peak torque be used to size belts? . . . Standard power-transmission practice has long rated belts at a certain horsepower at a given linear speed. Since horsepower is proportional to the product of pull times linear speed or torque times angular speed, it can be seen that a belt can be selected on the basis of torque. Either method is satisfactory and since belt tables are available in terms of speed and horsepower this usage is common.

How is torque on the reducer as caused by well load calculated? . . . The general pumping mechanism is shown in Fig. 1 with a well load indicated and a torque T supplied by the reducer to make the unit rotate. Fig. 1A shows the crank proper, (no counterbalance considered), the pitman load F, and the reducer torque T. The reducer torque must equal the pitman force F times the distance x as measured from the crank center to the pitman centerline extended. That is, $T = Fx$.

How can the distance x be evaluated? . . . The effective arm of the force is dependent on the crank position indicated as Θ in Fig. 1, and the geometry of the pumping unit. One very simple but crude way to evaluate the arm is to assume the distance x proportional to the sine of the crank angle times the crank radius, where Θ is measured from the vertical. This is at best only a rough approximation.

Where exact values are desired, the unit must be laid out to scale and the distance x measured. One method of calculating these values is given in A.P.I. Production Bulletin 232, page 332. Another exact method is to determine a polished-rod versus crank velocity curve; this again requires an accurate layout.

The torque can then be found from the relation:

$$T\omega = Pv$$

where:

- ω = angular velocity of the crank
- T = crank torque
- P = polished-rod load
- v = polished-rod velocity at a particular crank position

How is pitman force F determined? . . . The pitman pull F for a given well load will depend on the crank position and the unit geometry. It can be determined by a force layout for each desired crank position. Fig. 1 shows a layout for one position of the crank. The direction of the pitman force F must be along the center line of the pitman since there are only two forces acting. Since there are only three beam loads, they must meet in a point, thence by extending the direction of the pitman load until it intersects the direction of the polished-rod load the common point can be found.

The samson post bearing load, B, must also pass through the point, hence its direction will be along the line indicated. The force polygon can be completed as shown in Fig. 1B. When the approximation that $x = \sin \Theta$ is used, it is customary to assume F equal to P when the beam arms are equal. If the beam arms S_1 and S_2 (see Fig. 1) are unequal, F is determined by:

$$F = PS_1/S_2 \qquad (2)$$

What is the best method of calculating well-load torque? . . . The methods outlined require considerable layout work, but a reasonably accurate method is to consider the crank-pitman as equivalent to the crank-connecting rod of the slider crank or common engine mechanism. Torque factors which take into account the distance x and the effect of angularity of the pitman on the torque have been worked out for this mechanism. This approximation assumes the end of the beam moving in

TABLE 3

1	2	3	4	5	6	7	8	9
Θ	C_T	$L = 3.25\,C_T$	C_T	F	$T_w = C_T \times F$	Sin Θ	$T_w = W_r R \sin \Theta$	$T_r = T_w - T_c$
0	0	0	0	13,000	0	0	0	0
15	0.022	0.072	0.330	14,500	115,000	0.259	—67,000	48,000
30	0.085	0.277	0.625	13,600	204,000	0.500	—130,000	74,000
45	0.183	0.595	0.853	13,200	270,000	0.707	—184,000	86,000
60	0.304	0.988	0.994	16,000	382,000	0.866	—225,000	157,000
75	0.439	0.427	1.040	17,500	436,000	0.966	—251,000	185,000
90	0.573	1.862	1.000	18,000	432,000	1.000	—260,000	172,000
105	0.697	2.265	0.892	15,300	328,000	0.966	—251,000	77,000
120	0.804	2.613	0.738	14,200	252,000	0.866	—255,000	27,000
135	0.890	2.895	0.561	12,100	163,000	0.707	—184,000	—21,000
150	0.951	3.091	0.375	11,000	99,000	0.500	—130,000	—31,000
165	0.988	3.211	0.187	10,400	47,000	0.259	—67,000	—20,000
180	1.000	3.25	0	8,200	0	0	0	0
195		3.211	0.187	8,200	—37,000	0.259	67,000	30,000
210		3.091	0.375	8,000	—72,000	0.500	130,000	58,000
225		2.895	0.561	6,800	—91,000	0.707	184,000	93,000
240		2.617	0.738	5,600	—99,000	0.866	225,000	126,000
255		2.265	0.892	4,500	—96,000	0.966	251,000	155,000
270		1.862	1.000	3,700	—88,000	1.000	260,000	172,000
285		0.427	1.040	3,200	—80,000	0.966	251,000	171,000
300		0.988	0.994	3,100	—74,000	0.866	225,000	151,000
315		0.595	0.853	5,100	—104,000	0.707	184,000	80,000
330		0.277	0.625	8,200	—123,000	0.500	130,000	7,000
345		0.078	0.330	11,000	—87,000	0.259	67,000	—20,000
360		0	0	13,000	0	0	0	0

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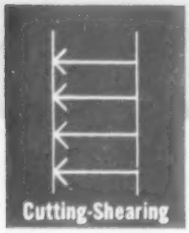
See How Grant Right Angle Cutters Cut and Shear—Never Corkscrew!



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a straight line. The geometry of the simplified system is defined by the pitman to crank ratio. Table 1 lists torque factors for various l/r ratios and crank angles.

These values will give more accurate torque values for normal unit proportions and will give higher values than those based on harmonic motion. It is necessary to apply the torque factor to the value of the force component in the direction of the assumed straight-line motion. The use of Equation 2 gives a satisfactory calculated value of F. When $S_1 = S_2$ the load to be used is the polished-rod value. The well-load torque (T_w) is given by:

$$T_w = r c_t F \qquad (3)$$

where:

T_w = well-load torque
r = crank radius, in.
c_t = torque coefficient from Table 1
F = vertical component of well load at pitman bearing

How are crank positions found on dynamometer cards? . . . One approximation used in determining the polished-rod position corresponding to various crank angles is to assume simple harmonic motion. A semicircle is then laid out on the displacement line of the dynamometer card as shown in Fig. 2. The desired angle positions are laid off on the semicircle and projected to the displacement line as shown.

A more accurate method is to again consider the crank pitman as equivalent to the slider crank mechanism. The corresponding displacement values (considering the polished-rod travel as l) are listed in Table 2. These values, when multiplied by the length of the card, give the various crank positions. (See example and Fig. 4.)

How is counterbalance torque determined? . . . The basic elements of a rotary or crank counterbalance are shown in Fig. 3. The rotary counterbalance weight is shown acting at a distance R from the crank center.

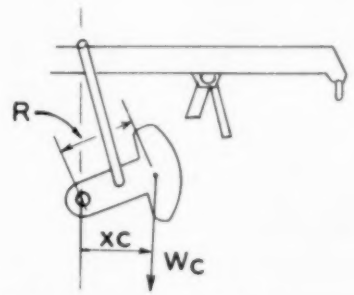


Fig. 3—The torque exerted by the counterbalance weights is the product of the weight and the horizontal distance x_c.

The counterbalance torque T_c is given by:

$$T_c = x_c W_c$$

where:

x = perpendicular distance from the crank center to the counterbalance weight W_c

This counterbalance torque has a different algebraic sign from that resulting from the force F.

How is distance x_c determined? . . . Since the direction of the force of counterbalance weight W_c is always vertical, the distance x_c will be given by $x_c = R \sin \theta$. Table 1 also includes values of sin θ. The torque will then be:

$$T_c = W_c R \sin \theta \qquad (4)$$

where:

T_c = counterbalance torque

Example of calculation of well-load torque . . . To illustrate the application of the above methods the dynamometer card shown in Fig. 4 will be used. If we take the pitman to crank ratio as 3½, a crank radius of 24 in., and $S_1 = S_2$, we have all the necessary information to carry out the calculations.

A tabulation is made as in Table 3, with the crank angle positions listed. Next the crank positions percentages are laid out in Fig. 4. It is, perhaps, easiest to list the values from Table 2 opposite the crank angle positions in Table 3. These are multiplied by the card length (3.25 in. in this example) as shown in Column 3. The displacement values are then laid off on the card in Fig. 4.

Next the torque factors from Table

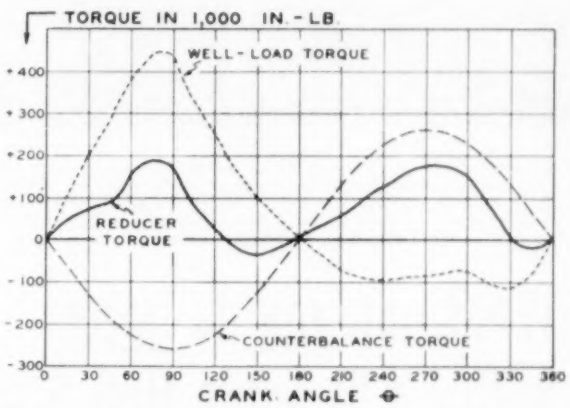


Fig. 6—Well-load torque in one direction and counterbalance torque in the other combine to cause a lesser torque in the speed reducer.

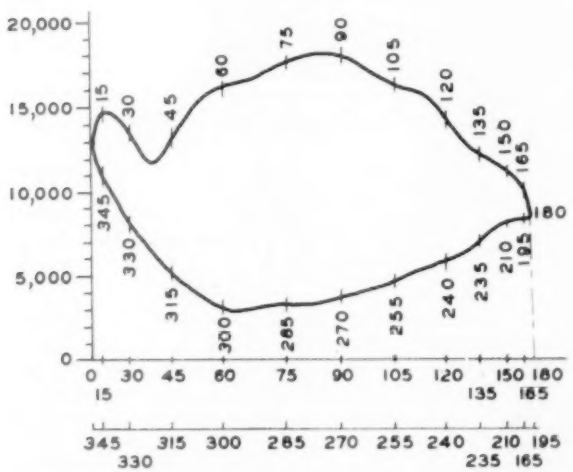


Fig. 4—This dynamometer card is marked for use in calculation of the torque on the speed reducer as caused by well load.

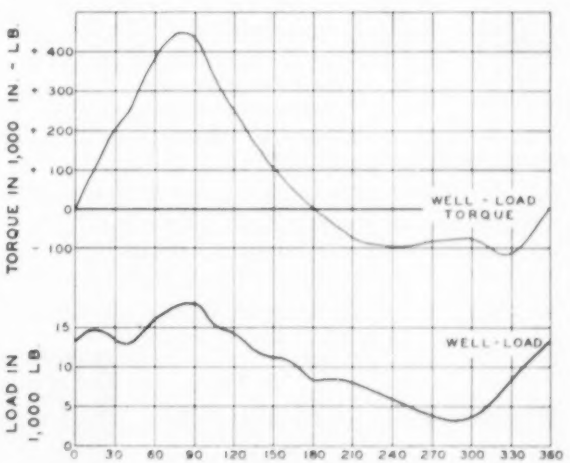
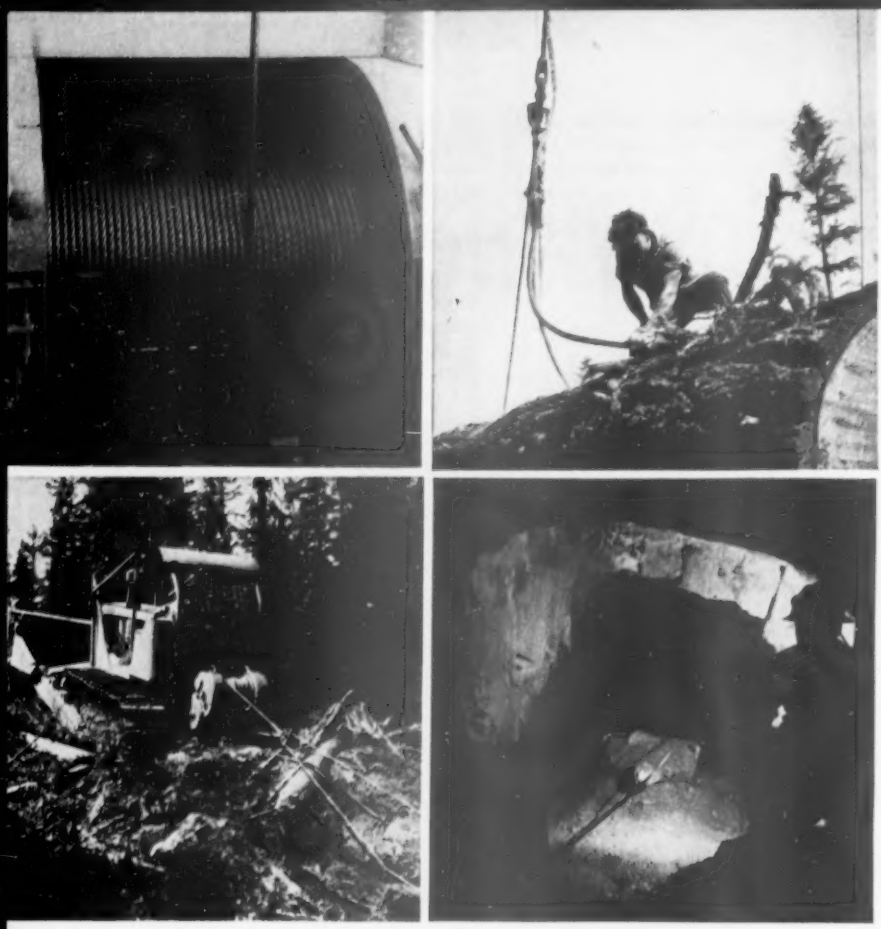


Fig. 5—The graph of well load and the torque caused by it often bear little resemblance to one another.



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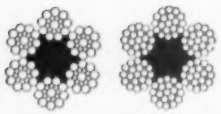

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I are listed in Column 4. The well loads corresponding to the crank angle positions are scaled off and listed in Column 5 of Table 3. The well-load torque is then found by multiplying Column 4 by Column 5 and by the crank radius (24 in.) as given by Equation 3 and listed in Column 6.

Fig. 5 is a plot of the well load and the well-load torque vs. the crank angle Θ. The well load when plotted against a crank angle (equivalent to time) has quite a different appearance than when plotted against polished-rod position. The torque is seen to be quite variable, being zero at each end of the stroke.

Example of calculation of counterbalance torque . . . The counterbalance torque is also easiest handled by listing the value in a table. Column 7 of Table 3 shows the value of sin Θ. Column 8 gives the calculated values of T_c for the case where $R = 40$ in. and $W_c = 6{,}500$ lb. The counterbalance torque is $T_c = W_c R \sin \Theta$. Since the counterbalance torque is proportional to the sine, it will be a harmonic curve.

Calculation of reducer torque . . . The torque imposed on the reducer will be the algebraic sum of the well-load torque and the counterbalance torque. The value of the reducer torque T_r is listed in Column 9 of Table 3. Fig. 6 is a plot of the well-load torque and the counterbalance torque. When these two are combined we have the reducer torque also shown in Fig. 6.

The well-load torque is the reducer if no counterbalance is used. Counterbalance greatly reduces this peak. If too large a counterbalance is used, that is, if the well is overcounterbalanced, the peak will occur on the downstroke instead of on the upstroke. Since the net torque or reducer torque is the difference between two sizable quantities, small changes in counterbalance can make a considerable difference in reducer torque. This is the reason careful attention needs to be given to proper counterbalance. For example, a reduction of 1,000 lb. in counterbalance weight gives an increase of about 40,000 in.-lb. in reducer torque. This is about a 22 per cent increase in reducer torque.

What is effect of increase in torque over rated torque? . . . The ratings which are placed on reducers are based on experimental or test values, and it has been found that an overload of 50 per cent above gear-reducer rating will on the average result in increase in wear of the order of seven times that when operated at rating.

Here's new light on

Deliverability Methods of Testing Wells

A panel discussion by . . .

C. F. Weinaug, head of the department of petroleum engineering, University of Kansas, Lawrence; Ferris Richmond, production engineer, Panhandle Eastern Pipeline Co., Liberal, Kans.; M. H. Cullender, engineer, Phillips Petroleum Co., Bartlesville, Okla., and Gordon Farr, Kansas State Corporation Commission, Lakin, Kans.

Weinaug: Deliverability is the ability of a well to produce under very specified conditions. These conditions vary with the procedure under which these tests are taken. Also, the procedure varies depending upon the state and the field being operated. Conditions and procedures for Kansas, Oklahoma, and Texas may be summarized as follows:

Farr: In Kansas the deliverability of each connected well in the field shall be determined as follows: Deliverability is the ability of said well to produce gas against 80 per cent of the average field pressure. The well first goes on flow test for 72 hours, at which time the well-head pressure and rate of flow are taken. At the end of the 72 hours, the differential shall not be higher than the average. Then the well is shut in for 72 hours, and rock pressure is determined.

Richmond: Basically the rules in Oklahoma are identical to the rules as set up by the Kansas Commission; the only difference is that Oklahoma requires a 72-hour preflow before the well is shut in for a rock pressure. At the end of the 72 hours, shut-in pressure is obtained and the well is tested for deliverability flow. The well shall flow at as near 80 per cent of the average field shut-in pressure for the duration of 72 hours as possible. At the end of 72 hours, rate of flow is obtained from an orifice meter and the well-head working pressure. The deliverability for the well is then calculated.

Both Kansas and Oklahoma define a "standard deliverability pressure." The two commissions take the shut-in pressures of all wells, and obtain an average shut-in pressure for all wells in the field. Standard deliverability pressure is 80 per cent of this figure. The two states use this same pressure in their calculations.

Common methods for determining standard gravity are used by the two states. The methods of calculating deliverabilities have been standardized. The number of significant figures used in calculations are the same in both states.

Condensed from a panel discussion, Gas Measurement Institute, Liberal, Kans. Held under auspices of University of Kansas, Extension Division.

Cullender: The deliverability tests in the Texas Hugoton field are taken in essentially the same manner as in Oklahoma. The 72-hour preflow period is required prior to the time the shut-in pressure is taken. After the shut-in pressure has been determined, the well is produced into the pipe line for 72 hours, with the rate of flow and pressure readings being taken at the end of the 72 hours.

At that point the calculations vary from the Oklahoma and Kansas calculations. In the first place, the deliverability pressure is taken at 80 per cent of the individual well's shut-in pressure rather than 80 per cent of the field average.

Also, the Texas Hugoton slope depends upon the individual well test rather than on the 0.85 average. To make that a little clearer, it does not depend on the actual slope of the well. It depends upon a correlation of slope versus deliverability performance recently adopted by the Texas Railroad Commission. Also, an operator is required to take only one test on the well, thereafter making an annual shut-in pressure correction. This shut-in pressure is taken following a 72-hour preflow period, just as the regular deliverability shut-in pressure is taken. That pressure is then applied to the previous flow data on the well to calculate the deliverability under the various rock-pressure conditions.

While West Panhandle field is not generally believed to be subject to deliverability tests inasmuch as the well's potential is determined for use in allocation formula, there is a deliverability test taken on all of the wells in the West Panhandle field. The preflow period is exactly the same as in Texas Hugoton field. However, the deliverability flow period is 48 hours rather than 72 hours. At the end of the 48-hour flow, the rate of flow and pressure readings are made in the same manner as in the other deliverability tests and the actual slope of the back-pressure curve of the well is applied to the deliverability data to calculate a 48-hour potential.

There is one big difference between West Panhandle and the Texas, Oklahoma, and Kansas Hugoton fields. Pressure data in the Hugoton fields are taken at the well head and no correction is made to sand face conditions, while in the West Panhandle field friction conditions, both on the multiple-point test (see Fig. 1) which establishes the slope, and the one-point test which establishes the 48-hour potential.

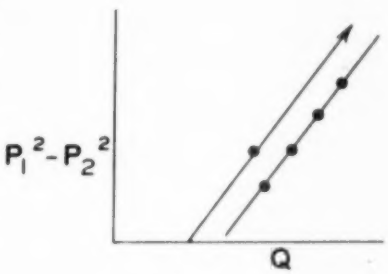

Fig. 1

In Fig. 1 the flow rate "Q" is plotted against $P_1^2 - P_2^2$, which is the difference between the shut-in pressure squared and the working pressure squared.

In conducting a multiple-point back-pressure test, three and sometimes four data points are taken. The well will be opened at one flow rate and the pressure condition determined and then again opened at a larger flow rate and the pressure condition determined, etc. Through these data points a straight line is drawn, and from this multiple-point test is determined the actual slope of the individual well that is being tested.

This test is of short duration—maximum of 4 hours. When the 48-hour flow rate is taken into a pipe line,

a single data point is obtained which is usually to the left (or smaller than the multiple-point test). Then the slope of the original test is applied to this data point with the pressure calculations being made to determine the potential of the well from this curve. Actually the calculation is mathematically determined from the 48-hour data point, but it gives the same result as the graphical determination.

Weinaug: Are there any questions?

Q: What is the preflow rate in Oklahoma?

A (Richmond): The preflow rate in Oklahoma is considered to be equal to the rate in which current allowable from the well is obtained: In other words, if there is a 30-day allowable, it is that rate at which the allowable could be produced in 30 days.

Q: What are the preflow rates in Texas?

A (Cullender): The preflow rate in Texas, both Texas Hugoton and West Panhandle, is determined in the same manner—the well is produced at its daily allowable rate of 72 hours.

Q: How should a new well be produced if it has no previous allowable?

A: Usually such wells, are produced at approximately 10 per cent pulldown. However, in Oklahoma the well may be produced for its deliverability test the first 72 hours and thus started from the long-time shut-in. In that respect, if a well is shut in by the state, the well does not have to have a preflow prior to the deliverability test but may start on a 72-hour deliverability flow from the long-time shut-in.

Q: What effect does the duration of the flow on the multiple-point test have on the back-pressure curve?

A (Cullender): Actually, we believe that it has no effect on the slope of the curve if each flow is of the same duration, the duration of flow merely moves the curve either to the right or left of its location at another time interval, as shown in Fig. 1.

Q: Should flow-rate determinations be made in the order of increasing flow?

A (Cullender): In the wells of the nature found in Hugoton field, I believe that particularly, the flow rates should be run in order of increasing flow.

If you run a well that stabilizes fast you can run in either sequence (see Fig. 2)—either 1, 2, 3, and 4, or 4, 3, 2, and 1 and get essentially the same curve. For an average well, say in Hugoton field, an increasing sequence test of 3-hour duration on each flow will have a slope, say of 0.8. If the flow rates run in the order 4, 3, 2, and 1, the slope will be less.

Q: What is the difference between 2 and 4-hour slopes if run in the same sequence?

A: There is practically no difference so long as the same flow rates are employed in each case.

Q: What is the effect of the difference in stabilization at the different flow rates?

A: It depends upon what you are talking about when you talk about stabilization. If you are talking about the amount of pressure drop per hour, the low points stabilize faster than the high points. However the log paper used in plotting back-pressure data takes care of that because it takes a greater pressure difference to shift the curve the same amount at the high end than it does at the other. The difference is a percentage difference. If you have a pressure drop of 15 psi., say 1 per cent would be .15 lb. an hour. If you have a pressure drop of 50 psi., then it still requires the same percentage change in the difference squared pressures to move the curve the same distance.

Weinaug: These differences are somewhat similar to the errors which occur in meters at high pressure differentials and at low pressure differentials.

Q: I would like to have an explanation of how slopes are determined on the pressure test curve.

A (Richmond): In the Bureau of Mines' Monograph 7 for this type test, the angle between the vertical axis and this line is used. The tangent of this angle is the slope of the line. The Texas Railroad Commission now uses the cotangent of the angle with the horizontal as the determination of slope. See Fig. 3.

The well should be allowed to stabilize before determination of the potential. Oklahoma requirements on stabilization are .1 psi. in 15 minutes, you would go up to the correct potential there by using the square of the shut-in pressure.

Q: Will an average well stabilize in Hugoton field, Texas, in 4 hours?

A (Cullender): I have not made any such tests myself, but judging from reports I don't believe you can say that all wells will stabilize in that time. In Panhandle field it usually takes 4 hours. In other words, you reach a certain "state" of stabilization. If they don't stabilize, plotting on log paper will take care of what little variations there might be.

Q: If the well is in good condition and doesn't start loading up with water, how long will it take the well to stabilize?

A (Cullender): A number of wells, possibly some Hugoton field wells, will not stabilize in a reasonable length of time, say anywhere from 3 to 10 days. Now in West Panhandle field there are many wells that will stabilize before you can take a pressure reading. Then there are other wells that will stabilize at varying times between those limits. We have run tests in Hugoton field of 3-hour duration and obtained a curve, then we have run tests on that same well for 24 hours and within reason had the same slope. Some of these same wells have had deliverability tests run over a number of years for 3 days. While not all of those deliverability points will fit a master curve since the tests were not taken under exactly the same conditions, in many cases a curve of the same slope as the short flow test and the 24-hour test will average the same as the 3-day tests.

Something that always bothers me about deliverability tests is the test

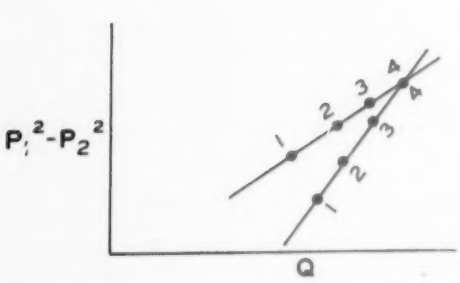

Fig. 2

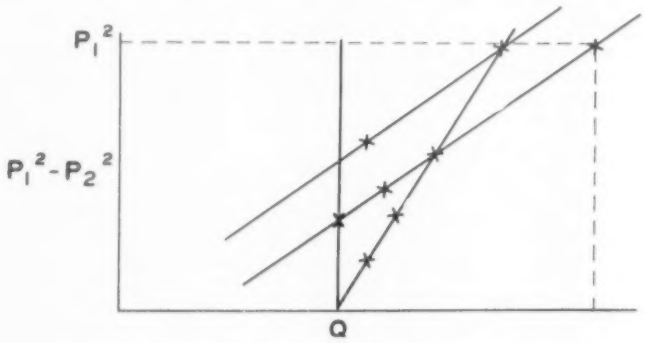

Fig. 3

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with respect to the actual curve of the well. The only justification for extrapolating a one-point test is that the actual slope of the back-pressure curve is available. If a one-point test is run at 10 per cent pull-off and the data are extrapolated to 20 per cent pull-off, and then a similar test run at 20 per cent pull-off, the calculated flow will not be duplicated unless the slope of the back-pressure curve of the well is the same as the slope that was assumed.

We know that all wells do not have an 0.85 slope. Depending upon the actual slope of the well the extrapolation will give an error one way or another. This is the reason for specifying certain conditions with respect to the test rate so that you can't flow at a very small pull-off on a well with a steep slope and extrapolate—or at a high rate on a well with flat slope. You can get into a lot of arguments about which is the best way to run this test, because if a well is pulled too hard water may be pulled in. This will shift the data point to the left, and the loss may be more than the gain.

Q: Should a well be penalized for failure to get 10 per cent pull-down when well-pressure is below standard deliverability pressure?

A (Richmond): The State of Oklahoma requires that a well be pulled down to its standard deliverability pressure. If the 10 per cent pull-down is below standard deliverability pressure there is no penalty involved. In Kansas we are required to get full 10 per cent pull-down or take the penalty regardless of standard deliverability pressure.

A (Cullender): Since the deliverability test is a test to determine the ability of a well to produce under stated conditions, namely in Kansas and Oklahoma, 80 per cent of average pressure, I don't believe the well should be penalized if it is tested exactly under those conditions. In other words, if a well was tested at the standard deliverability pressure, even if that was not 10 per cent pull-off, I think it should be the deliverability of the well without further calculations. The purpose of standard deliverability pressure was to try to keep low-pressure areas from being aggravated. The intention was to decrease the allowable on low-pressure wells and in that respect the standard deliverability pressure does a good job.

A (Farr): It seems to me the word "penalty" is used out of place. I don't believe we can really state that a well is penalized. It is strictly "conservation."

Q: Is there any definite proof as to the best test between 70 per cent and 90 per cent pull-down?

A (Richmond): Each individual well will have a different slope. If the slope is a very steep slope a 90 per cent pull-down, extrapolated out on 0.85 slope, will give deliverability. At that high rate the reservoir may be damaged. The nature of the well determines whether 70 per cent or 90 per cent is the best.

Farr: The Kansas order states that "A well shall be pulled as near its standard deliverability pressure as possible."

Q: What approximate per cent of final shut-in pressure is obtained in the 72-hour shut-in period to shut-in pressure of well when allowed to reach final shut-in pressure?

A: One well may have one condition existing and another well another. Some wells stabilize in 15 minutes or just as fast as you can record the pressure. On other wells of low permeability, it is possible they may take 30 to 60 days to stabilize after the shut-in. The extent to which a well's pressure is built up at 72 hours depends upon the flow rate prior to the time the well was shut in and the pressure at which it was shut in. We have observed anywhere from 15 to 30 psi. difference in 72-hour stabilized pressure, depending on how the well is pulled prior to being shut in for 72 hours.

A (Richmond): There is another thing that might enter into that—location of adjoining wells. It is possible that a well's shut-in pressure may build

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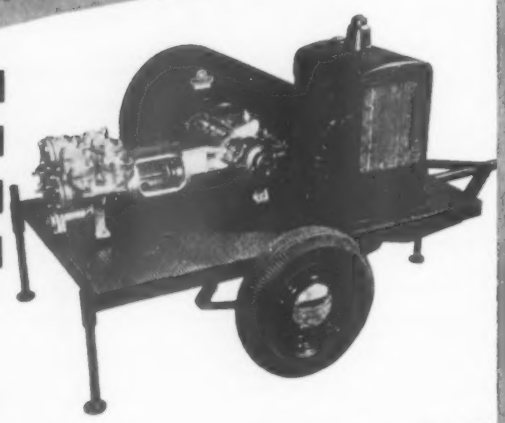
FIG. 535
SKID OR TRAILER MOUNTED
SPECIFICATIONS

Piston	Stroke	BPH	PSI	HP	Wt. Lbs.
2"	5	35	900	15	700
2½"	5	56	520	15	700
3"	5	83	350	15	700
3½"	5	115	255	15	700

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up within say 15 minutes. Then a nearby well is started flowing at a high rate. The shut-in pressure may start back down from there. As gas is taken out of the reservoir, if the other well is in the close proximity where it will take some gas away from the shut-in well, pressure may decline after a certain period.

Q: I would like to hear some discussion on wells which load with water on shut-in periods.

A (Richmond): As near as I have been able to determine, in some localities there is static water. Regardless of the rate of pull, the water table is there. At shut-in the water table is increased. Some wells don't have static water level, then with high rates of flow there is a coning effect of water pulling into the well. In some cases so much water may come into the well that the gas stream will not lift the water from the well bore.

Q: Do you think there is such a thing as abnormal deliverability on water wells?

A (Richmond): My contention is on deliverability that you are not entitled to any more than test will indicate for the well. If you could better the condition of your well, getting a high rate of flow for a period of time, I'd say you are entitled to it.

Q: What would be the effect on deliverability of water loading?

A (Richmond): Normally, the cause of water in any gas well is the deterioration of the well. That would have a tendency to decrease deliverability, and cut down on permeability. Also, if calculations are made on sand - face values it affects the friction factors. Even the best methods of calculating are unsatisfactory to take care of anything except dry gas.

Weinaug: Under our method of testing it would penalize you, wouldn't it, if the well loaded up, because it would give a low rock pressure?

A (Richmond): Normally under the present methods of calculating, if working pressure at the 10 per cent pull-down below rock-pressure point is greater (where the factor is greater than 1) the lower rock pressure gives an advantage on deliverability. But if the well working pressure is below standard deliverability pressure, then the high rock pressure would have a tendency to raise deliverability.

Q: If the first point falls to the right of the four-point test, can the potential of the well be increased by running the four-point test over? What causes this condition?

A (Cullender): This shouldn't happen, but it does. You take the multiple-point or four-point test then later take a one-point test and the one-point test falls to the right of the back-pressure curve. Now the reasons are several. I think the main reason is that many tests in West Panhandle field were run as far back as 1945, and at that time there was no strict limitation on running a test in increasing sequence.

A number of tests were taken in reverse sequence. The well was pulled hard on the first point, then the succeeding reverse sequence points resulted in a false slope which was very flat. The reason was obvious . . . these tests extrapolate very well. Sometimes on a very good test a very flat slope is obtained due to errors in the friction calculations. Usually the multipoint test was taken at high rates whereas the one-point test was run at a low rate. It just depends on where the intersection of the true curve and the flat curve is with respect to present pressure level as to whether a new test will increase the calculated potential.

A (Richmond): A test may be run on a well in proper sequence with a very flat slope resulting. Then at a higher rate a steep slope is obtained. What causes that is moisture or water in the formation. At a low rate the water is not lifted out; consequently you are penalized on rate as well as pressure. If you increase the rate, the points move to the right. When running a one-point

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test, one to the right of the curve is probably obtained. Here is another one of the conditions where you will have to know the well if you want to get the full benefit of everything that the state allows.

Q: What is the relationship between the back-pressure curve and deliverability test?

A (Cullender): If deliverability points are following a curve parallel to the back-pressure curve, you will have a pretty good well staying in good condition. When a well starts deteriorating (water starts giving trouble), I believe it is actually on a curve with the same slope but the performance may be so erratic from year to year that you can't tell it. Generally the larger the well the nearer the deliverability curve is to the short time curve and the better alignment there is on the deliverability points. Often you find a well, if it is a good well, on which the annual points will line up as well as the back-pressure test on the well.

There are a few wells where the deliverability points come right back on the back-pressure curve. Generally the size of the well controls the amount that the deliverability curve will shift from the back-pressure curve.

Q: In taking back-pressure test 3 or 4 years after the first one was taken, how will the test vary?

A (Cullender): If the duration of flow and the well conditions remain constant there should be no appreciable difference. The lower pressure should not affect the coefficient or slope of the curve. If some deterioration has taken place, the coefficient shows decrease without any change in the slope. However, if water has accumulated around the well, the test results may be very difficult to interpret.

Q: Don't you move the curve bodily to the left?

A (Cullender): Theoretically the slope should remain constant but the curve may be shifting with each flow rate.

If a well has been producing at low flow rates for a long period of time, there may be a considerable amount of condensed liquids around the well. If the well is not cleaned up prior to testing, the first point may be displaced to the left. As the flow rate is increased the points may approach the true curve and finally reach and follow this curve. The opposite effect may result from water encroachment at high flow rates with the low flow rates following the true curve and the high flow rates being displaced to the left.

Q: If rock pressure is lowered during test will the well be penalized?

A (Richmond: Any additional production from a well, particularly in Hugoton field, where we don't get exact stabilization at 72 hours, will have a tendency to lower rock pressure. If, by lowering rock pressure the well is pulled below standard deliverability pressure, the well will be penalized. Tests should be taken under ideal conditions. That is going to improve deliverability.

Q: How long should a well be shut in prior to deliverability tests?

A (Farr): As I see it, the difference of 1 day's pull on a well at low deliverability rate is insignificant. Some companies have various periods of shut-ins. The period they should be shut in is up to the operator. Deliverability tests are taken under as near ideal conditions as possible to get proper share of the allowable. Sometimes after a good deliverability test, it is difficult to produce the allowable.

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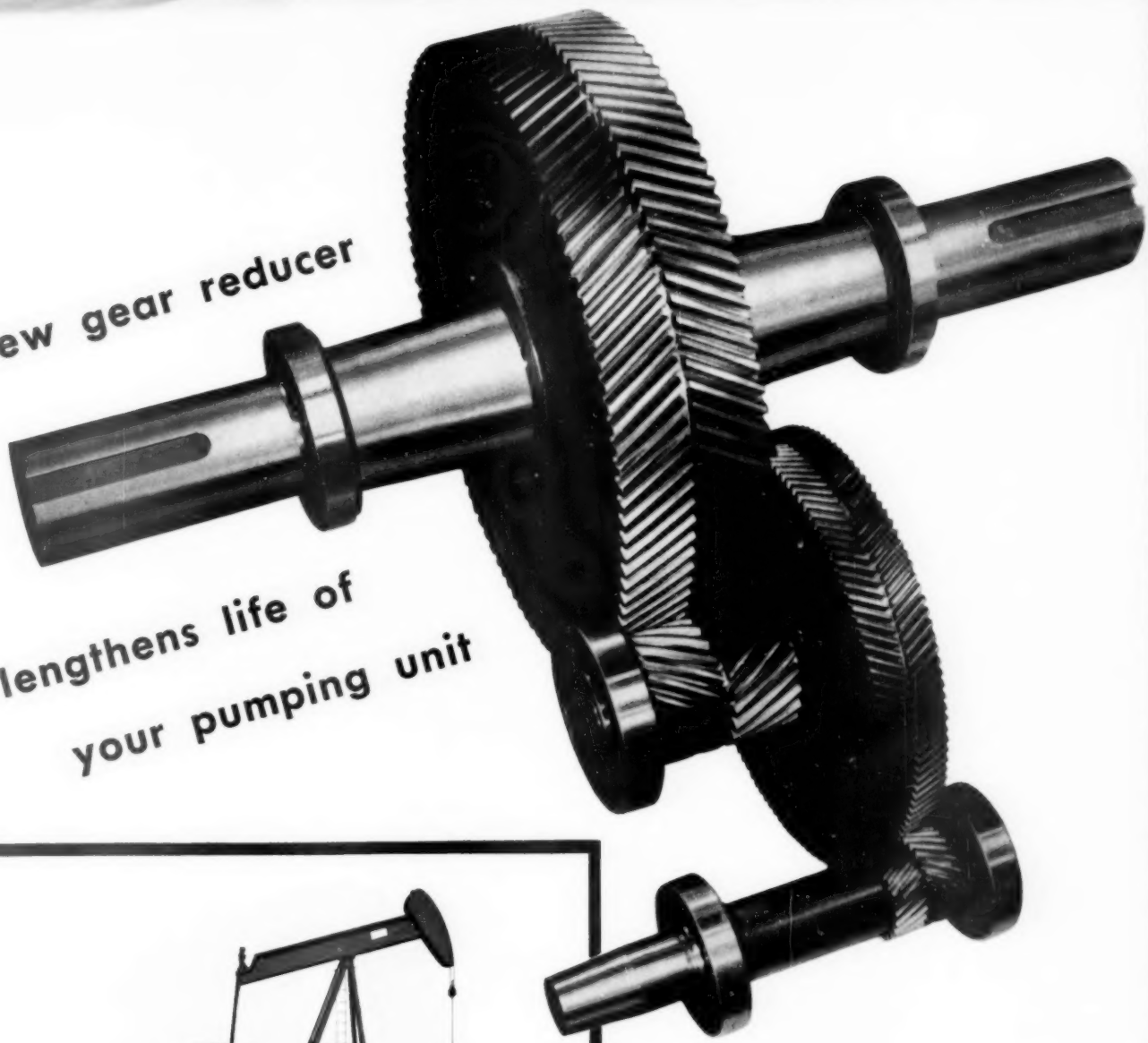

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The reason is in their manufacture. Each heat of steel is treated according to the requirements for that particular steel, as determined by D+B metallurgists. D+B's electronically controlled heat-treating furnace makes possible true full-length normalizing and drawing. This, plus accurate time and temperature controls is producing sucker rods having greater strength, ductility and resistance to impact.

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TYPE 5 SUCKER RODS — for heavy duty pumping in medium corrosive wells. Made of nickel molybdenum alloy steel in sizes of ⅝" to 1". Pony rod sizes, ⅝" to 1"; lengths, 2' to 12'.

HEATREAT #1 CM SUCKER RODS — for medium and heavy pumping, where corrosion is not a problem. Fabricated from controlled, fine grain carbon manganese steel and full-length normalized. Rod sizes, ⅝" to 1". Pony rod sizes, ⅝" to 1"; lengths, 2' to 12'.

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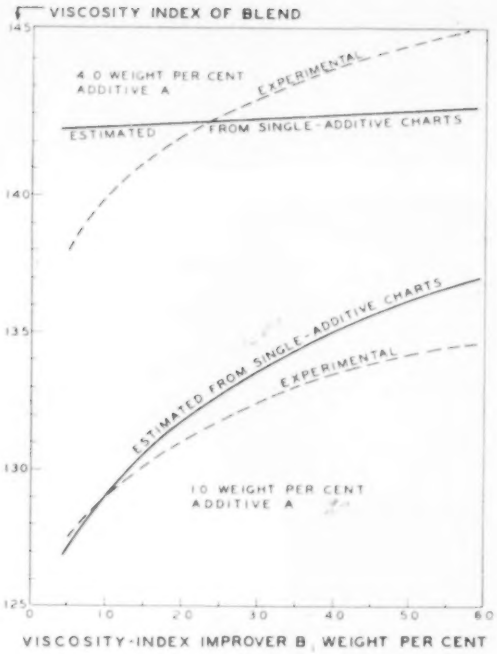

VISCOSITY INDEX OF BLEND
4.0 WEIGHT PER CENT ADDITIVE A
EXPERIMENTAL
ESTIMATED FROM SINGLE-ADDITIVE CHARTS
ESTIMATED FROM SINGLE-ADDITIVE CHARTS
EXPERIMENTAL
1.0 WEIGHT PER CENT ADDITIVE A
VISCOSITY-INDEX IMPROVER B, WEIGHT PER CENT

Fig. 1—Viscosity indexes of oil-additive blends. Viscosity index of base oil 107; viscosity of base oil S.U.v. at 210° F. 42.3.

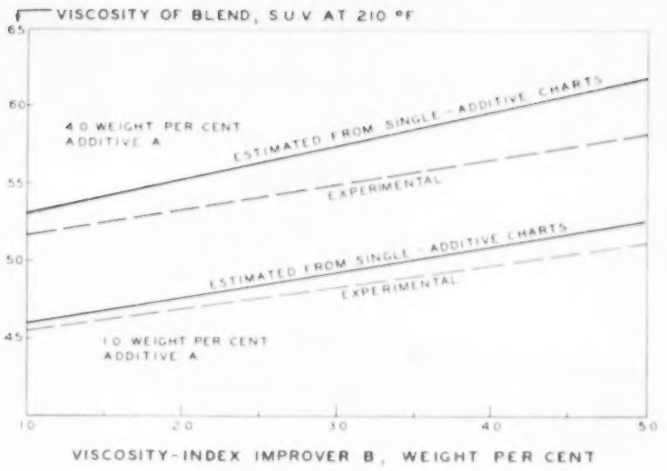

VISCOSITY OF BLEND, S.U.V AT 210 °F
4.0 WEIGHT PER CENT ADDITIVE A
ESTIMATED FROM SINGLE-ADDITIVE CHARTS
EXPERIMENTAL
ESTIMATED FROM SINGLE-ADDITIVE CHARTS
EXPERIMENTAL
1.0 WEIGHT PER CENT ADDITIVE A
VISCOSITY-INDEX IMPROVER B, WEIGHT PER CENT

Fig. 2—Viscosity of oil-additive blends. Viscosity index of base oil 107; viscosity of base oil S.U.v. at 210° F. 42.3.

How to Predict Viscosity Indexes

. . . of oils containing two v. i. improvers

by G. W. Wharton

THE petroleum industry is continually striving to produce improved lubricants that will reduce automobile engine wear to a negligible magnitude. A major portion of the wear occurs while starting the engine, particularly in cold weather, when oil is viscous. This can be remedied by employing fluid, low-viscosity oils which retain their lubricating qualities at operating temperatures.

High-viscosity-index oils are required for this purpose so that temperature change will have little effect on the viscosity. Commercial viscosity-index improvers are often added to the oil to attain this desired characteristic, and in many formulations two improvers are employed to produce such oils economically.

V.I. prediction . . . Methods for predicting the true viscosity index and viscosities of the oil-additive mixture are important to the refiner since considerable experimental work is avoided if accurate blending data are available. Blending charts have been developed[1,3] to aid in selection of viscosity-index improvers and estimation of viscosity and viscosity index of the oils containing them. However, these charts are restricted to the use of a single viscosity-index improver in the blend.

The work done in Magnolia Petroleum Co.'s laboratories showed that considerable error is introduced if the above charts are used for estimating viscosity index and viscosity of blends containing more than one viscosity-index improver. This is demonstrated in Figs. 1 and 2. They show that the difference between the estimated and experimental quantities of viscosity-index improvers required to attain the desired properties may be as high as 50 per cent or more. The quantities actually required to obtain a certain viscosity are greater than those estimated from the charts. However, actual additive requirements to obtain a certain viscosity index may be either higher or lower than those estimated depending on the quantities of the two improvers used.

New nomographs . . . Nomographs, or blending charts, can be prepared to permit the accurate prediction of viscosity index and viscosity for systems containing two or more viscosity-index improvers. Typical nomographs applicable for blends containing commercial additives designated as "A" and "B" are shown in Figs. 3 and 4. The following example illustrates the method for using such charts:

Problem: Given a base oil blend of 101 v.i. and 43 S.U.v. at 210° F., calculate the quantity of additive "A" necessary to secure a final product of 137 v.i. Assume 3 per cent additive "B" (based on the oil) will be used. Also estimate viscosity of the final blend.

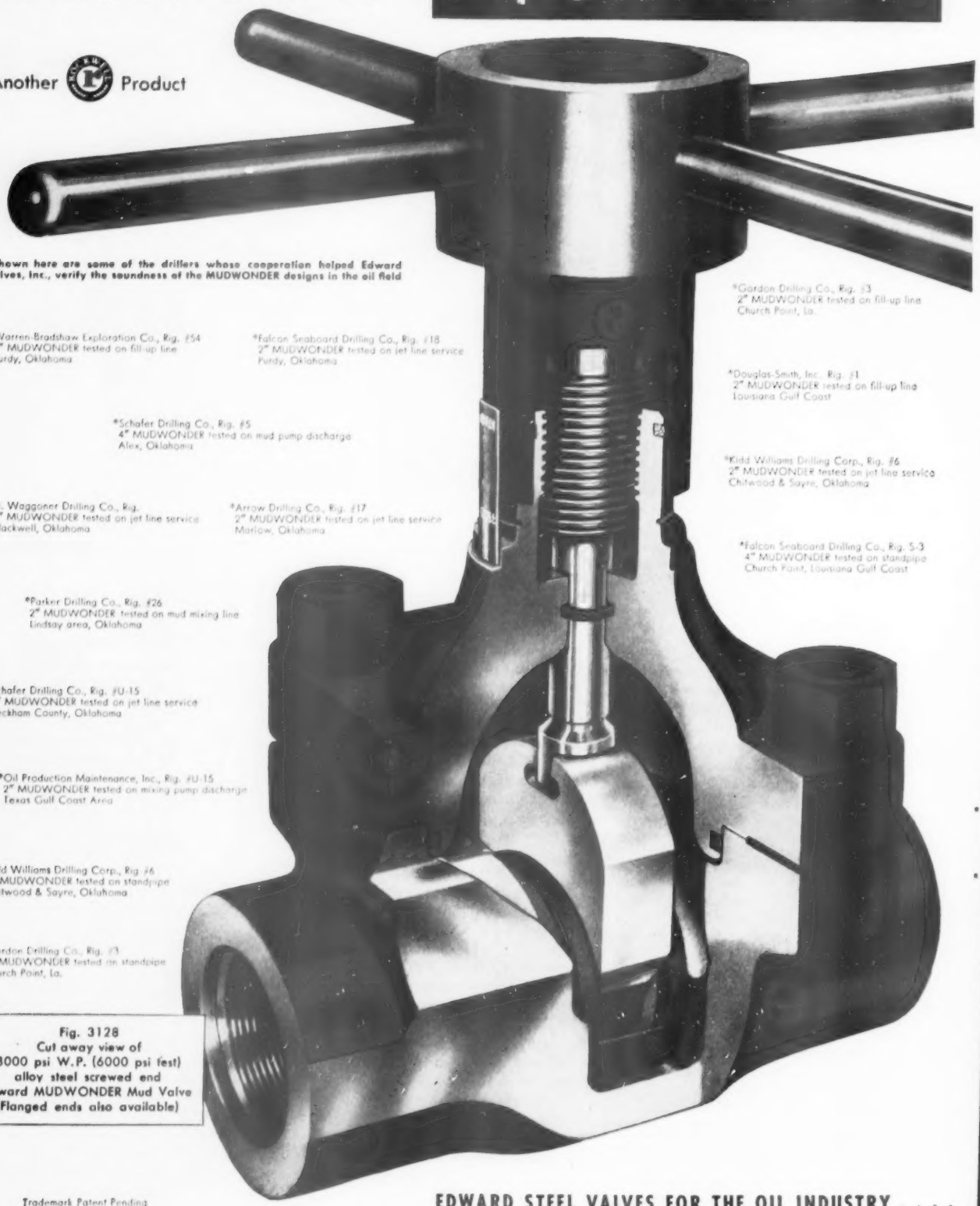
Solution: The quantity of Additive A required to obtain the 137 viscosity index blend is obtained from the nomograph in Fig. 3; the viscosity of the final blend is then determined from the nomograph in Fig. 4.

Estimation of the quantity of Additive A in the blend: Using Fig. 3 draw a line between the points on the scales "D" and "C" showing viscosity and viscosity index of the base stock, respectively. Mark the point of inter-

The author is in the technical department, refining division, Magnolia Petroleum Co., Beaumont, Tex. Paper presented at W.P.R.A. regional meeting, Beaumont, February 12, 1954.

Edward MUDWONDER

Another Product



***Shown here are some of the drillers whose cooperation helped Edward Valves, Inc., verify the soundness of the MUDWONDER designs in the oil field**

*Warren-Bradshaw Exploration Co., Rig. #54
2" MUDWONDER tested on fill-up line
Purdy, Oklahoma

*Falcon Seaboard Drilling Co., Rig. #18
2" MUDWONDER tested on jet line service
Purdy, Oklahoma

*Schafer Drilling Co., Rig. #5
4" MUDWONDER tested on mud pump discharge
Alex, Oklahoma

*H. Waggoner Drilling Co., Rig.
2" MUDWONDER tested on jet line service
Blackwell, Oklahoma

*Arrow Drilling Co., Rig. #17
2" MUDWONDER tested on jet line service
Marlow, Oklahoma

*Parker Drilling Co., Rig. #26
2" MUDWONDER tested on mud mixing line
Lindsay area, Oklahoma

*Schafer Drilling Co., Rig. #U-15
2" MUDWONDER tested on jet line service
Beckham County, Oklahoma

*Oil Production Maintenance, Inc., Rig. #U-15
2" MUDWONDER tested on mixing pump discharge
Texas Gulf Coast Area

*Kidd Williams Drilling Corp., Rig. #6
4" MUDWONDER tested on standpipe
Chitwood & Sayre, Oklahoma

*Gordon Drilling Co., Rig. #3
4" MUDWONDER tested on standpipe
Church Point, La.

*Gordon Drilling Co., Rig. #3
2" MUDWONDER tested on fill-up line
Church Point, La.

*Douglas-Smith, Inc., Rig. #1
2" MUDWONDER tested on fill-up line
Louisiana Gulf Coast

*Kidd Williams Drilling Corp., Rig. #6
2" MUDWONDER tested on jet line service
Chitwood & Sayre, Oklahoma

*Falcon Seaboard Drilling Co., Rig. 5-3
4" MUDWONDER tested on standpipe
Church Point, Louisiana Gulf Coast

Fig. 3128
Cut away view of 3000 psi W.P. (6000 psi test) alloy steel screwed end Edward MUDWONDER Mud Valve (Flanged ends also available)

Trademark Patent Pending

EDWARD STEEL VALVES FOR THE OIL INDUSTRY . . . .

. . . A NEW ROCKWELL-BUILT MUD VALVE TESTED AND APPROVED BY OIL MEN

Hail outstanding performance during 21-month testing on rigs in Oklahoma, Texas, Louisiana

Here's the story. The all-new Edward MUDWONDER is a tough, dependable mud valve, priced to meet competition. Edward Valves, Inc., a subsidiary of Rockwell Mfg. Co., spent four years in research and development of this new mudline valve; then, 21 months in the oil fields of Oklahoma, Texas and Louisiana proving its ruggedness and making refinements.

The MUDWONDER was designed to stop "down-time" caused by mud valve failures. It operates faster and easier . . . and without a cheater, besides. It eliminates sanding-up and fouled stem threads. And, the new MUDWONDER seldom requires any field maintenance. Its resilient insert and hard chrome plated gate stubbornly resist wear. However, if necessary, either or both can be changed without disturbing mudline hook-ups, while the crew makes a connection.

Edward is an old hand with oil. Since 1904, the steam power and the oil processing industries have been using Edward steel valves for especially tough jobs. Now, the MUDWONDER makes Edward's "Quality First" slogan a by-word in the oil fields, too.

Plan to use the MUDWONDER on your next hole. Better still, start cutting rig down-time today by replacing troublesome mud valves with MUDWONDER. You'll be happy with the results.

Get complete details on the all-new Edward **MUDWONDER** from your favorite supply store or write, wire, call Edward Valves direct—East Chicago 231.

Edward Valves, Inc.

SUBSIDIARY OF ROCKWELL MANUFACTURING COMPANY
1492 W. 145th St.
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. . . . GLOBE AND ANGLE · GAGE · CHECK · INSTRUMENT · STOP-CHECK · GATE · SPECIAL VALVE DESIGN

New Nomographs Simplify V. I. Calculations for Oils Containing Two V. I. Improvers

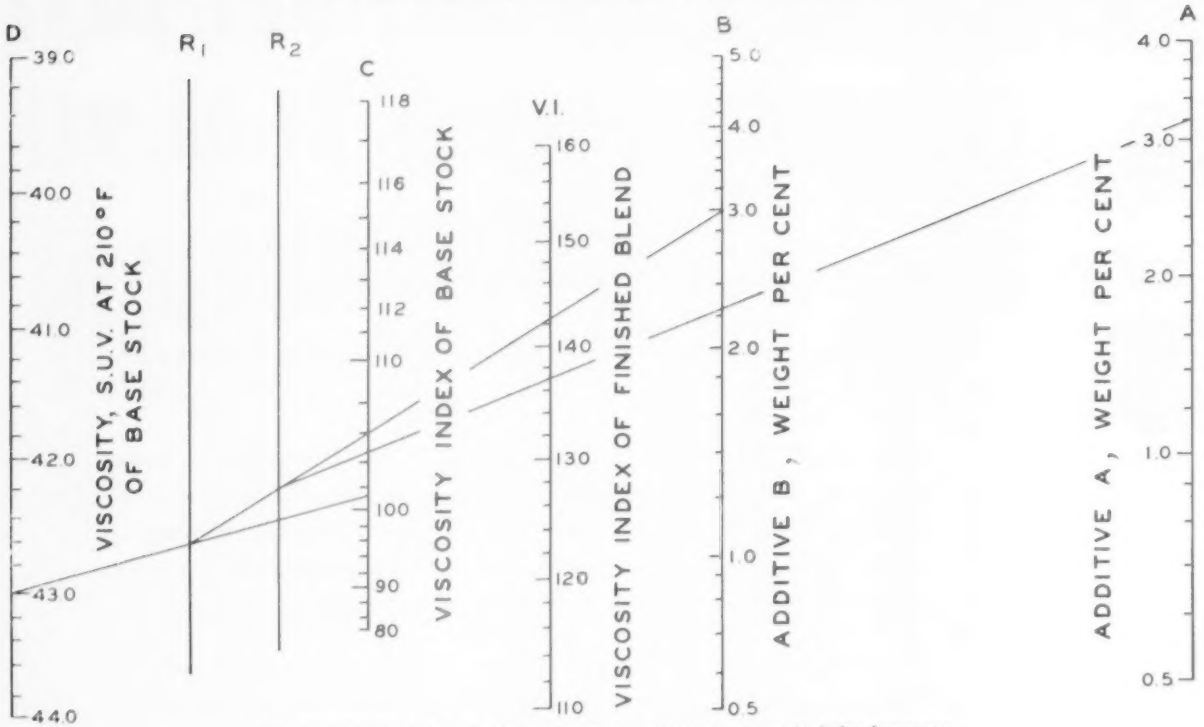

Fig. 3—Viscosity index of lubricating oils containing two viscosity-index improvers.

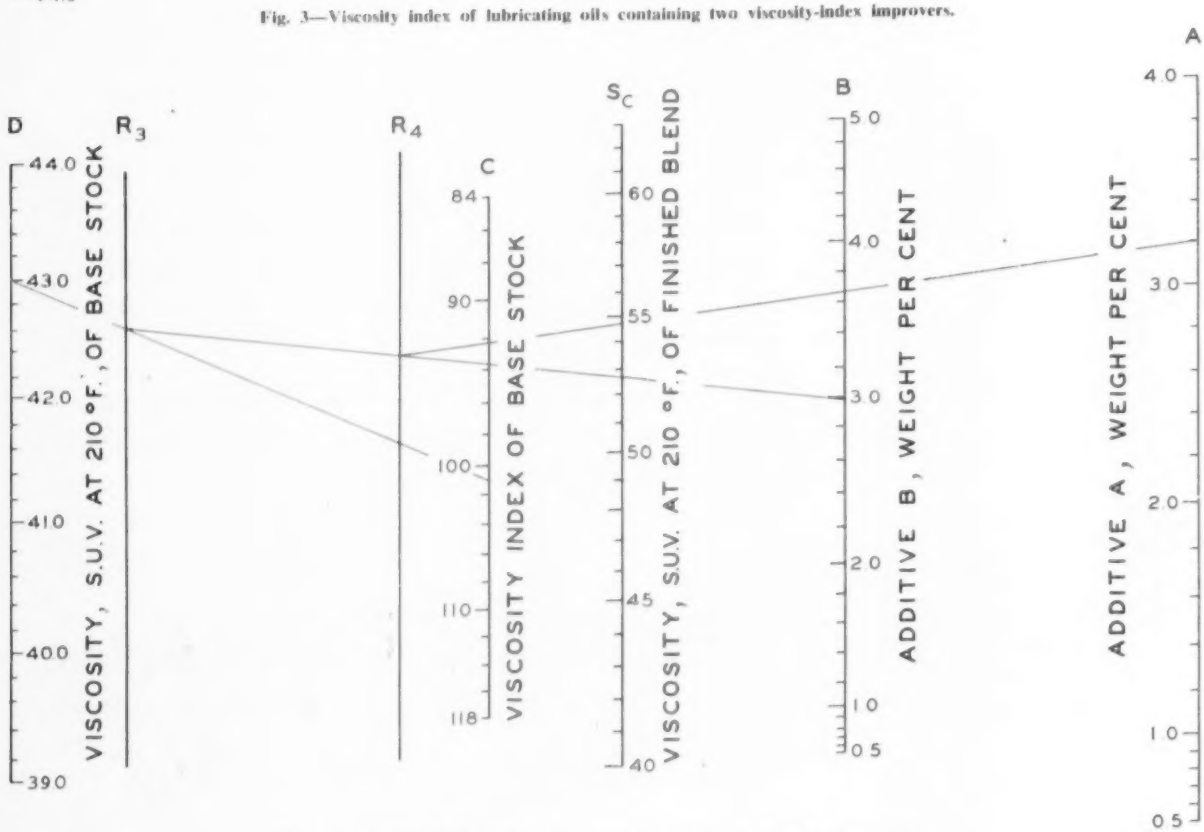

Fig. 4—Viscosity of lubricating oils containing two viscosity-index improvers.

section of this line with reference line R_1. Connect this point with the point on Scale B showing per cent Additive B used in the blend. Mark the point of intersection of this line with the reference line R_2. Connect this point with the point on Scale V.I.$_c$ showing desired viscosity index of blend and extend this line to Scale A. Point of intersection with Scale A represents the quantity of Additive A needed to obtain the 137-viscosity-index blend. This quantity is 3.2 per cent weight based on the oil.

Estimation of viscosity of blend: Using Fig. 4 connect points on the Scales C and D showing viscosity and viscosity index of the base oil, respectively. Mark the point of intersection of this line with the reference line R_3. Connect the intersection point with the point on Scale B showing the quantity of Additive B employed. Mark the intersection with the reference line R_4. Connect this point with the point on Scale A showing the quantity of Additive A used in the blend. The point of intersection of this line with Scale Sc represents the viscosity of the blend containing the two additives. In this case the viscosity is 54.8 S.U.s. at 210° F.

The charts should not be used for estimating viscosity indexes or viscosities of blends containing less than 0.5 per cent weight of either additive.

Constructing nomographs . . . Separate nomographs must be constructed for each pair of additives employed, but they are applicable for all base oils regardless of the crude-oil source. For constructing the nomographs algebraic equations must be developed as follows:

Viscosity index of the blend is estimated from the following empirical equation:

$$\text{Log V.I.}_c = a \log A + b \log B + c \log C + d \log D + K$$

where:

V.I.$_c$ = calculated viscosity index of the blend

A = quantity of Viscosity-Index Improver A expressed in per cent weight on the oil

B = quantity Viscosity-Index Improver B expressed in per cent weight on the oil

C = viscosity index of the base oil

D = S.U.v. of the base oil at 210° F.

a, b, c, d, and K = constants

The equation contains five constants which must be determined. This is done by using five experimental blends, substituting the observed values into the original equation and solving for the constants. However, more than five blends should be prepared to compensate for inaccuracies involved.

Similarly:

$$\text{Log } S_c = a' \log A + b' \log B + c' \log C + d' \log D + K'$$

where:

S_c = viscosity of the finished blend, S.U.v. at 210° F.

A, B, C, and D = same nomenclature as used in the former equation.

a′, b′, c′, d′ and K′ = constants different from those used in the former equation.

The same blends are used in determining constants for both equations.

The equations employed for the construction of the nomographs in Figs. 3 and 4 are as follows:

$$\text{Log V.I.}_c = 0.098 \log A + 0.023 \log B + 0.348 \log C - 1.012 \log D + 3.024$$

$$\text{Log } S_c = 0.128 \log A + 0.073 \log B - 1.515 \log C + 1.472 \log D + 2.260$$

The standard method for constructing nomographs from the algebraic equations has been used.[2]

The accuracy of the nomographs shown is ±1.0 viscosity-index points and ±0.4 S.U.v. at 210° F. These deviations are within the precision of the A.S.T.M. procedures for the viscosity and viscosity-index determinations. Comparison of the observed viscosity indexes and viscosities of the blends with those estimated from the nomographs is shown in Table 1.

TABLE 1—COMPARISON OF OBSERVED AND CALCULATED VISCOSITY INDEX AND VISCOSITY OF OIL-ADDITIVE BLENDS

Viscosity index			Vis., S.U.v. at 210° F.		
Calculated	Observed	Error	Calculated	Observed	Error
146.5	145	+1.5	52.6	51.9	+0.7
141.0	141	0.0	56.8	57.2	−0.4
138.0	139	−1.0	49.6	49.2	+0.4
144.0	143	+1.0	53.4	53.2	+0.2
142.0	143	−1.0	46.8	46.6	+0.2
141.0	142	−1.0	49.0	49.2	−0.2
136.5	137	−0.5	55.5	56.2	−0.7
143.5	143	+0.5	48.3	48.1	+0.2
131.5	130	+1.5	51.8	51.4	+0.4
Average		1.0	Average		0.4
Max. error		1.5	Max. error		0.7

Economical quantities . . . These charts are used in determining the combinations of improvers that will produce the desired product quality from a given base stock. The most economical quantities of the two additives in the blend are then calculated from the nomographs by the following procedure:

On the nomograph in Fig. 3 the quantity of Improver B added to a base oil of selected characteristics is varied throughout the range of usable concentrations. The corresponding quantity of Improver A necessary to obtain the specified viscosity index of the product is then estimated in the same manner as the example problem. The quantity of one additive increases as the requirement for the other additive decreases.

The total cost of both additives for each combination is plotted against quantity of either additive employed in these blends. The lowest point on this curve shows the most economical quantities to be used commercially. Such a curve is shown in Fig. 5. In this case the desired 137-V.I. blend is obtained with a minimum cost of the viscosity-index improvers by employing 3.2 per cent weight Additive A and 3.2 per cent weight Additive B.

For a fixed viscosity of the product, the viscosity for each of the above combinations is obtained from Fig. 4 and marked on the curve in Fig. 5.

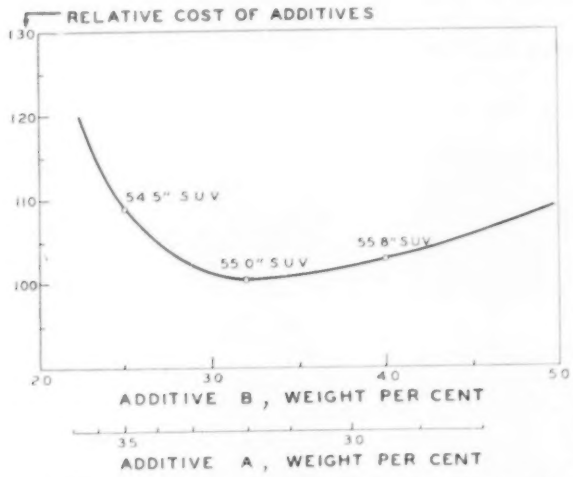

Fig. 5—Relative total cost of combinations of two viscosity-index improvers. Finished blend 137 viscosity index.

Acknowledgment

The author would like to express his appreciation to Magnolia Petroleum Co. for permission to publish the manuscript.

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2. Lipka, Joseph, "Graphical and Mechanical Computation—Part 1. Alignment Charts," New York, John Wiley & Sons, Inc., 1918.
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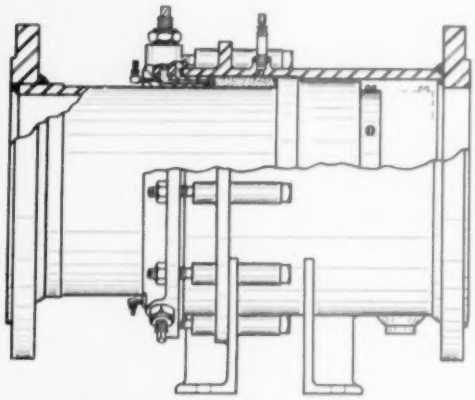


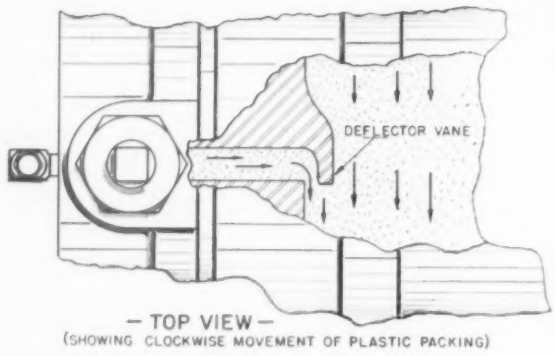
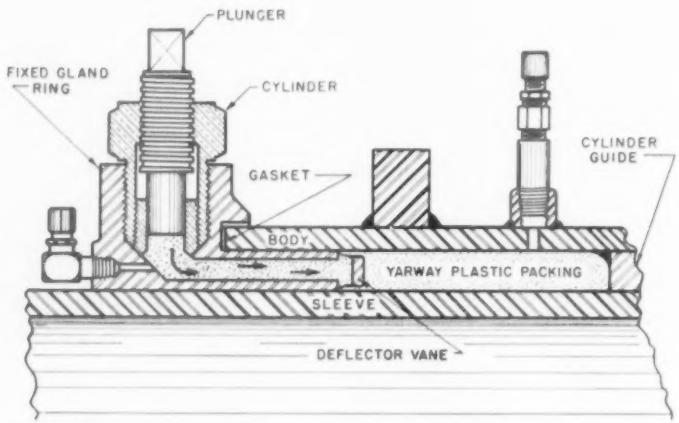


Fig. 1—Gun-packed type slip joint is shown in these three drawings. Packing is forced through small channels in the gland ring.

Slip-type expansion joints

. . . they're cheaper, simple, durable, and easy to service



by K. S. Roberts

SLIP joints are relatively inexpensive, especially when compared with alternative methods of absorbing expansion. They are simple and durable. They take up a minimum of space for the job they do, i. e. one joint can absorb up to 24 in. of expansion, or the same as that required by a pipe span 650 ft. long subjected to a temperature range of over 400° F.

Author is mechanical engineer, Yarnall-Waring Co.

With the gun-packed design, maintenance is reduced to a minimum consisting of periodic lubrication—usually 2 or 3 times a year on steam service and occasional additions of plastic packing—usually not more than twice a year. These operations can be done at any time and with full pressure and temperature on the line. This means continuous, no-shutdown service at minimum expense.

General construction . . . Slip joints are commonly made of steel, cast iron, or bronze. Material used depends on pressure and temperature in pipe line and pipe diameter. For moderate to high pressures all-steel joints with wrought seamless-steel sleeve and body have definite advantages such as high strength, light weight, small space requirements, and easy fabrication of special anchor bases and service outlets for specific job requirements.

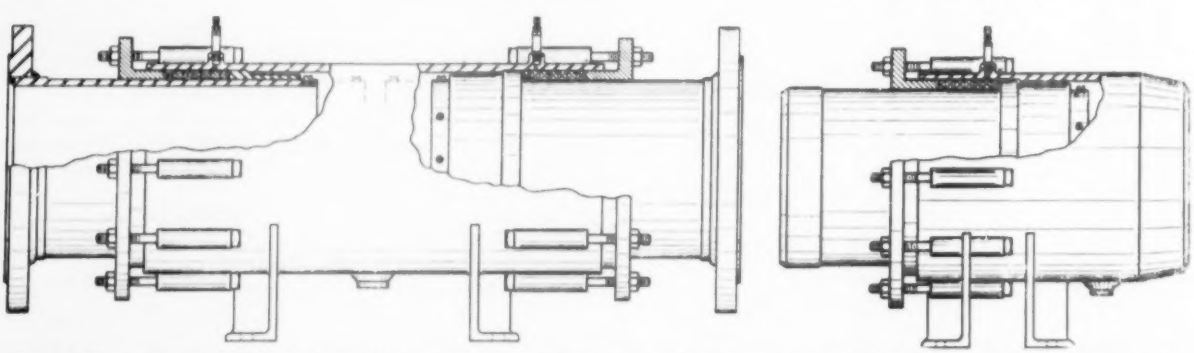
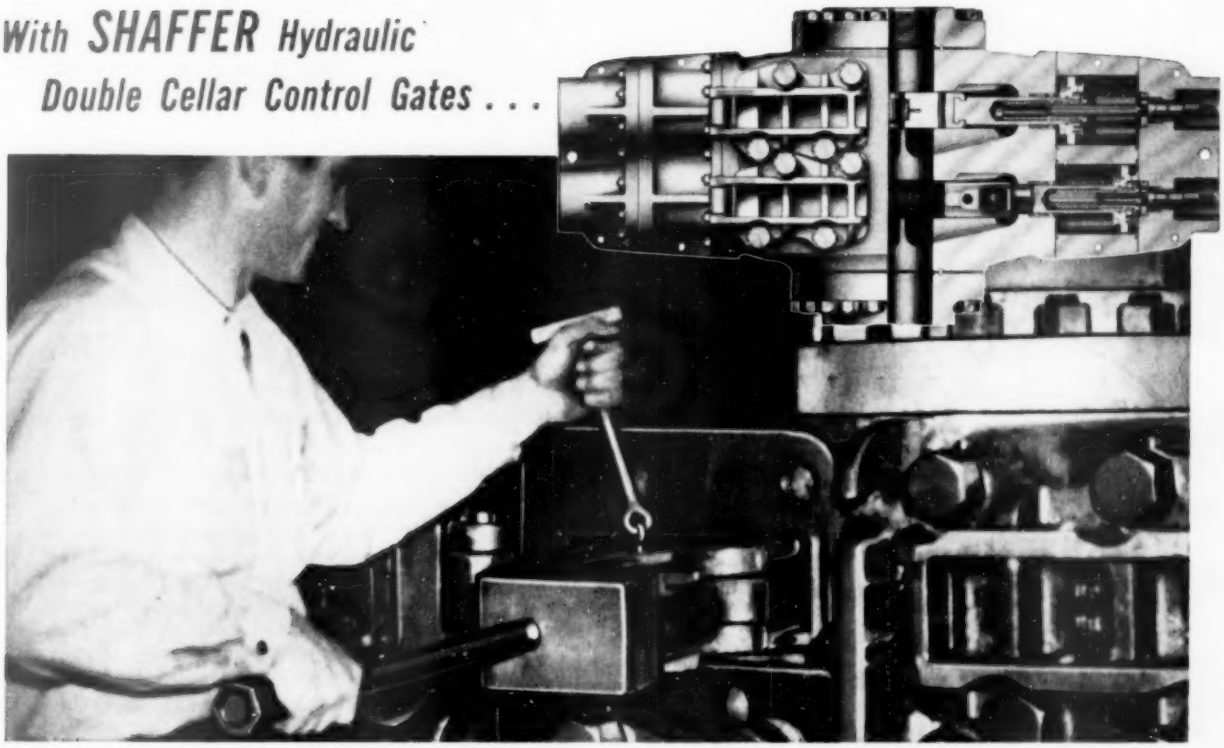


Fig. 2—These are gland-packed joints which resemble gun-packed units but have conventional asbestos rubber and duck ring packing.

With SHAFFER Hydraulic Double Cellar Control Gates . . .

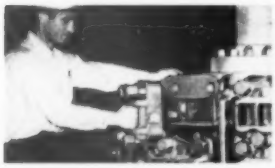


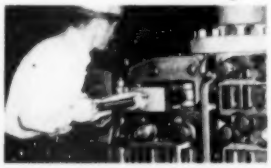
Both top and bottom ram compartments are serviced with equal simplicity!

When considering the purchase of cellar control gates, it will pay you to study *carefully* the design and operating features of the various units available. You'll find that Shaffer – *on every point* – is years ahead in safety, compactness and all-around operating and servicing simplicity.

For Example: With Shaffer Hydraulic Double Cellar Control Gates there is no need to disassemble the upper unit to change rams in the lower unit. Rams in *either* compartment can be changed separately and independently, without in any way disturbing the other compartment.

And what a cinch it is to make such ram changes!





Simply open doors on the side of the Gate, replace the rams, then bolt the doors shut again. Closing the doors *automatically* aligns the rams within the Gate. It's as simple as that!

Note that there is no need to allow extra space at the ends and above the Gate in order to change rams. Therefore, compactness in the two most critical dimensions – length and height – remains constant at all times with Shaffer Hydraulic Gates . . . another important advantage of the patented Shaffer side-opening design!

Other advanced Shaffer Features

include (1) Completely Enclosed Design, with no exposed moving parts to become damaged or jammed.

(2) Self-Draining Compartment Bottoms, with rams traveling on guide ribs high above any detrimental mud or sand that might accumulate.

(3) Direct Hydraulic Drive, without secondary connections or complicated arrangements to close and open the rams.

(4) Choice of Double or Single Gates in all sizes — select the type that best meets your individual requirements.

Before you buy any cellar control gate equipment, get full details on these and still other Shaffer advantages from your nearest Shaffer representative. Or write direct!

Send for your free copy of the complete Shaffer catalog. See the Shaffer section of your Composite Catalog.

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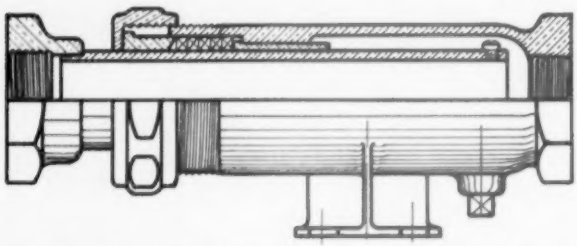

Fig. 3—Small slip-type joints have screwed fittings and are suitable for absorbing expansion in smaller piping systems of many different types.

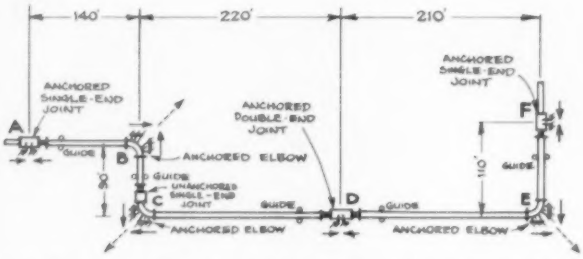

Fig. 6—Typical refinery piping system using slip joints to absorb expansion.

Fig. 1 shows construction details of a single-end, gun-packed, all-steel slip joint. The sliding sleeve is polished seamless steel with a layer of hard chromium plating. This minimizes friction and protects the surface against corrosion and erosion. The sleeve is guided internally and externally for accurate alignment in the stuffing box. Internally the sleeve is guided by a long cylindrical guide welded to the seamless steel body of the joint. Surrounded by the steam or other fluid in the pipe, the cylindrical guide expands and contracts equally with the sleeve, permitting close radial clearance with complete freedom of linear movement. Externally the fixed gland ring serves as an external or outside guide for the sliding sleeve. Ring is grooved for accurate centering on the body. Made of cast steel, it has two or more bosses (depending on joint diameter) into which packing guns are screwed.

Packing . . . Slip joint in Fig. 1 is known as a gun-packed type because the packing is forced into the stuffing box by the jack action of a wrench-operated plunger threaded in a cylinder. Thus, additions of packing can be made while the line is under full pressure. The packing used is a semiplastic, heat-resistant, high-grade, long-fiber asbestos, combined with an inert filler and impregnated with high fire-test mineral oil. It is furnished in small slugs for easy insertion in packing gun.

Packing is forced through small channels in the gland ring (Fig. 1) and contacts deflector vanes which distribute it evenly around the stuffing box. Vanes also act as check valve to prevent back flow when fresh packing slugs are inserted. **New packing is easily added while the line is under full pressure without removing either the gland or the old packing.**

Lubrication . . . Joints like that in Fig. 1 have Alemite fittings for lubrication of the packing and the sliding sleeves. Angle fittings are attached to the gland ring, one opposite each packing gun to provide packing lubrication at these points and insure easy passage of packing through the channels in the gland.

Additional fittings, of the double-ball-check type, are attached radially to the body of the joint at the stuffing box. Lubricant recommended for joints in steam lines is a high-superheat mineral oil.

Gland-packed joints (Fig. 2), resemble gun-packed units but have conventional asbestos or rubber and duck ring packing. Cast-iron glands are generally used. Body and sleeve are wrought steel, and sleeve is polished and chromium plated.

For small steam and hot liquid lines, screwed-end, gland-packed joints, as shown in Fig. 3 are suitable. These are

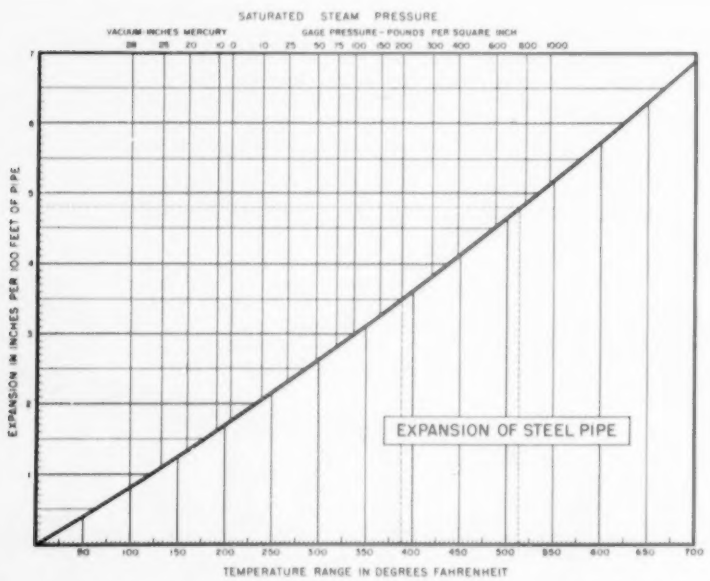
SATURATED STEAM PRESSURE
VACUUM INCHES MERCURY
GAGE PRESSURE - POUNDS PER SQUARE INCH
EXPANSION IN INCHES PER 100 FEET OF PIPE
EXPANSION OF STEEL PIPE
TEMPERATURE RANGE IN DEGREES FAHRENHEIT

Fig. 4—This chart permits quick determination of the expansion of steel pipe for various steam pressures and temperatures.

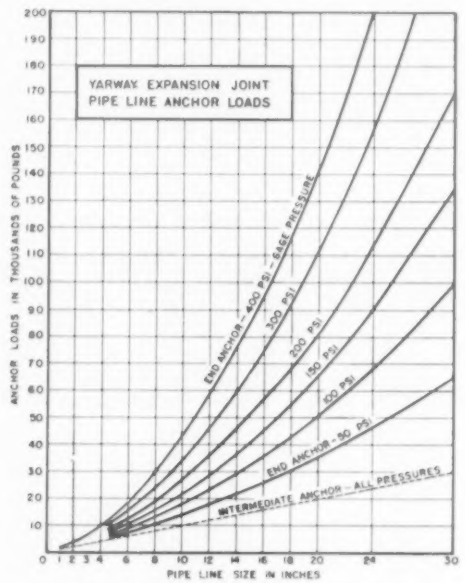
YARWAY EXPANSION JOINT
PIPE LINE ANCHOR LOADS
ANCHOR LOADS IN THOUSANDS OF POUNDS
END ANCHOR - 400 PSI - GAGE PRESSURE
300 PSI
200 PSI
150 PSI
100 PSI
END ANCHOR - 50 PSI
INTERMEDIATE ANCHOR - ALL PRESSURES
PIPE LINE SIZE IN INCHES

Fig. 5—Chart for determining anchor loads on slip-type expansion joints.

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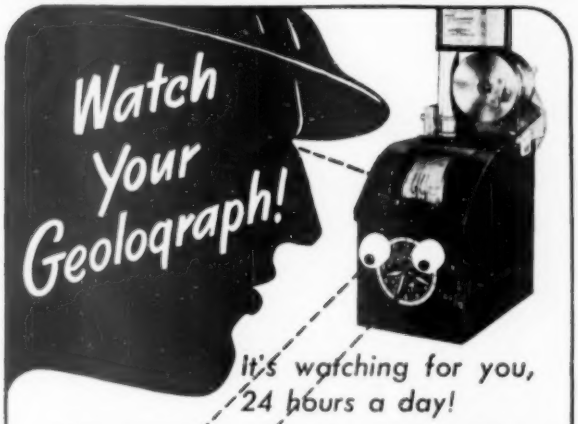

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used extensively in tracer, hot water, and heating-system lines. They are all-brass and are available with sleeves at one or both ends of traverses up to 12 in. at each end.

End connections . . . Gun-packed and gland-packed joints have end flanges welded to the sliding sleeves in double-end units and to sleeve and body in single-end type. Welding ends are also available, if desired instead of flanges.

Service outlets for branch lines, with flanged, welded, or screwed connections, can be provided on gun and gland-packed joints.

Single-end joints are furnished with or without anchor bases, as required by the installation. Double-end joints are always furnished with anchor bases, since anchorage is essential to their proper, balanced operation. Anchor bases are wrought steel and can be welded to joint bodies in virtually any position desired by the piping designer. The flexibility of design provided by welded fabrication facilitates adaptation of these points to particular job requirements.

System Design

Traverse selection . . . Sleeve movement needed for a given temperature range depends on pipe material and length of pipe. Fig. 4 shows the expansion of steel pipe in inches per 100 ft. for various temperature ranges, and also for various saturated steam pressures related to 0° F.

When determining temperature ranges for outdoor refinery and transmission lines, be careful to consider the possibility of subzero temperatures during winter. If atmospheric temperature at the time joint is installed is higher than the lowest temperature expected in winter months, push sleeve in about ¼ in. for each 33° F. Difference between installation temperature and lowest temperature expected.

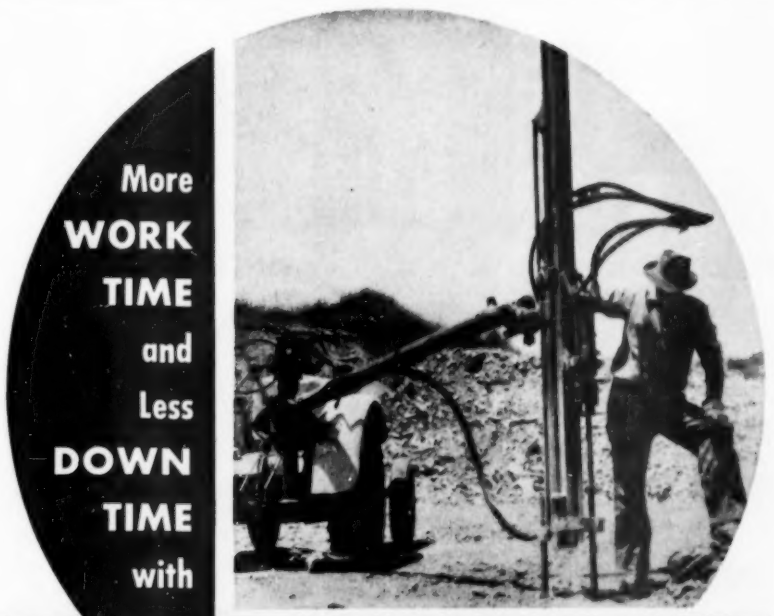
Anchor loads . . . Intermediate anchors in straight sections of pipe must carry the friction load of the expansion joint sleeve in its stuffing box, plus friction in pipe hangers, supports, and alignment guides. End anchors, as at elbows and terminals, carry an additional load equal to product of line pressure and internal pipe area. This is commonly called internal pressure thrust. At elbows and tees the "resultant" anchor load is vector sum of thrusts in the two or more legs.

Fig. 5 shows approximate loads on end and intermediate anchors for various pipe sizes and pressures in systems using slip joints. Anchors should be designed to withstand these loads and their resultants with an adequate factor of safety. Expansion joint anchor bases may be used as end anchors provided that resultant loads and moments are determined to be within the allowable shear and tensile strength of the anchor bolts.

TABLE 1: RECOMMENDED SPACING FOR GUIDES AND SUPPORTS (FEET)

Nominal pipe sizes (in.)	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Distance between alignment guide and exp. joint.																
Gun-Pakt	8	10	11	12	13	14	15	16	18	20	21	22	23	24	25	26
Glan-Pakt	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
Distance between alignment guides	10	13	15	19	22	25	30	35	45	60	70	80	90	100	105	110
Maximum distance between pipe supports	8	10	11	12	13	14	15	16	18	20	21	22	23	24	25	26

Pipe guides and supports . . . Proper alignment of the pipe is necessary for virtually all expansion joints, regardless of type. With slip-type joints it is im-



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portant to insure free and concentric motion of the sleeve through the stuffing box, and this is most effectively done by installing an alignment guide a short distance from the joint.

The maximum permissible distance between joint and guide generally depends upon the pipe size and the design of the joint. Internally-externally guided joints permit greater joint-to-guide distances than do simple internally guided joints, and this a a factor to be considered in the selection of joints for a particular job.

Typical recommended joint-to-guide distances for slip joints are given in Table 1. Note that distances for gun-packed joints are roughly twice those of gland-packed joints, because gun-packed are internally-externally guided.

Installation

When installing expansion joints, careful alignment of each joint and the adjacent guides is very important to insure long, trouble-free service. In outdoor installations the possibility of very low temperatures should be provided for as described above under Traverse Selection. It is wise to provide ample space around each joint to facilitate lubrication and packing. Exposed sleeve surfaces should be protected by dust covers.

To insure maximum efficiency in steam transmission lines, condensate should be removed through a steam trap connected to a drain opening at bottom of the expansion-joint body. The trap should handle condensate as fast as it forms and discharge into a return line if one exists.

Typical System

Fig. 6 shows a typical refinery piping system using slip joints. It consists of an 8-in. steel line having a total length of 770 ft. It carries steam at 125 psig. with 25° F. superheat. Procedure for finding traverses, anchor loads, and guide and support locations is as follows:

Traverses . . . Saturation temperature for 125-psig. steam is 355° F. (Fig. 4). Add 25° F. for a total temperature range of 380° F. Pipe expansion for this temperature range is 3.4 inches per 100 feet, from Fig. 4.

Span AB=140 ft; expansion=(140) (3.4)/100=4.8 in. A single-end joint with an 8-in. traverse is suitable at Point A. Span BC is 90 ft. long, has an expansion of 3.1 in. when figured as above. Slip joint at C is single-end with a 4-in. traverse. Span CD is 220 ft. long, has an expansion of 7.2 in. A double-end joint with an 8-in. traverse at each end is suitable at D. Span EF is 110 ft. long, has an expansion of 3.7 in. A single-end joint with a 4-in. traverse is suitable.

Anchor loads . . . Intermediate anchors at A, D and F are subject to possible maximum loads of 800 lbs. in both directions. These values are obtained from Fig. 5 for 8-in.-diameter pipe. Contraction loads equal the expansion loads but are in the opposite direction.

End anchors at B, C, and E have possible maximum loads of 15,000 lbs. (solid arrows, Fig. 6). These loads have a resultant of 21,000 lbs. acting along an axis at 45° with pipe axes (dotted arrows, Fig. 6). Contraction loads in the reverse direction consists of friction only. Friction loads are 8,000 lbs. along solid arrows, with an 11,300-lb. resultant.

From Table 1, assuming joints are of gun-packed design, install an alignment guide not farther than 18 ft. from each joint and at intervals of about 45 ft., more or less, along the pipe. Also from Table 1, the pipe should be supported at intervals of about 18 ft. and wherever concentrated loading exists due to valves and fittings.

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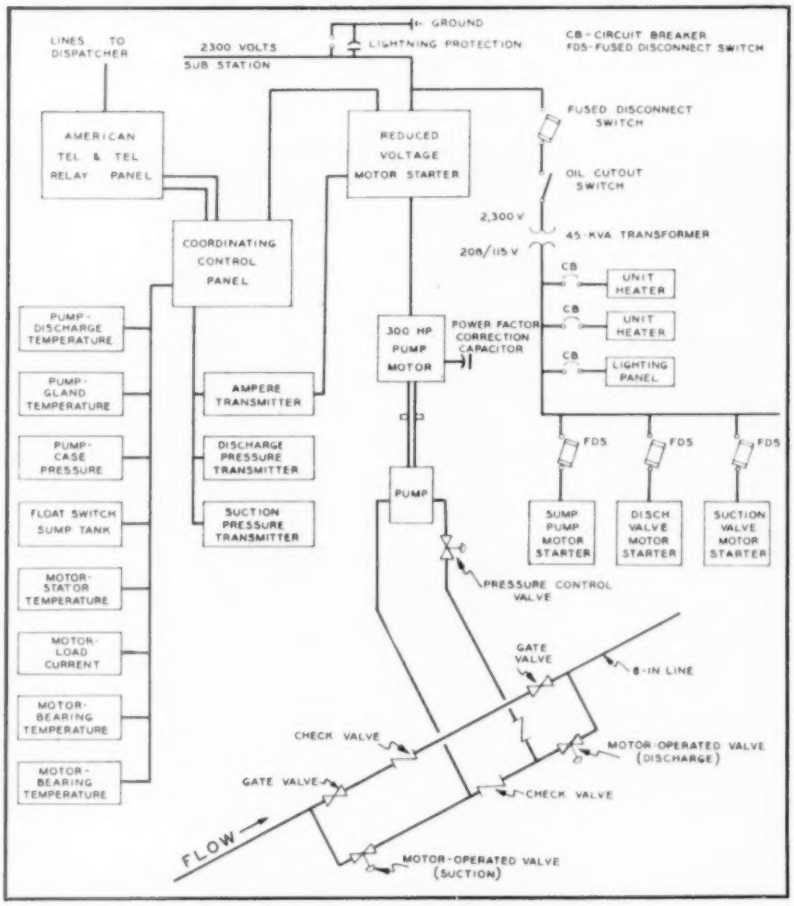

Fig. 1—Schematic block diagram of automatic pipe-line station.

How to achieve optimum flow for minimum cost

by J. W. O'Leary

FOR a given pipe-line system there is a point of optimum flow for minimum transportation cost; increasing the flow beyond this point without additional investment cause the operating and labor cost to rise so rapidly that transportation cost becomes prohibitive. If flow must be increased, there are two alternate solutions to the problem, 1 addition of pumping stations to present system or, (2) construction of loop lines.

The author is with the Synchronous Speciality Motor and Generator Department, General Electric Co., Schnectady, N. Y.

With the advent of the automatic pipe-line system and its saving in operating costs, Method 1, the addition of stations, is the most attractive solution in a great many instances.

In the automatic pipe-line system a dispatcher, located at a suitable position, can set up a schedule of requirements and can control the system to meet those requirements.

Functional requirements . . . The functional requirements of the equipment for an automatic pipe-line system are not complex. In the system described here, the dispatcher starts a station by dialing a number assigned to that station on a dial similar to the one on any telephone. The signal is conveyed by telephone line to the proper station and closes a relay there.

If all protective devices are in their reset position and the discharge valve is closed, the relay will initiate the starting sequence:

The pump suction valve opens and, when it is fully open, the pump motor starts. The discharge valve opening is timed so that it is completely open a few seconds after the pump motor reaches full speed.

To stop a station the dispatcher dials another number assigned to that station and the stop sequence is initiated:

The starting relay is deenergized and the run contactors are opened, removing the pump motor from the line. At the same time, contacts are made which cause the suction and discharge valves to close.

A monitor system is required to keep the dispatcher informed of operating conditions at each pumping station. When the dispatcher wishes to know conditions at a station, he dials a third number assigned to that station and the following information is telemetered:

1. The pump suction pressure.
2. The pump discharge pressure.
3. The motor line current.

This information is printed on a teletype machine. For instance, the suction pressure may be transmitted as a series of S's where each character represents 10 psi. If a total of 20 characters are printed, the suction is 200 psi.

Telemetering . . . Automatic telemetering is accomplished by the use of notching relays to connect the various information sources to the communication equipment in a predetermined sequence. In normal order the notching relay connects the suction-pressure transmitter to a voltage source and at the same time causes the telemetering equipment to send a series of characters. The voltage source starts at zero value and rises linearly with time to some final value. At the time this voltage reference reaches the same value as the pressure transmitter, a sensing relay stops the transmission of characters.

The discharge-pressure transmitter is then connected to the voltage reference source, which has been reset to zero, and the process is repeated. In a like manner, the motor line current is then transmitted.

At the controlling station the total pressure and current values can be readily measured by means of a scale located on the teletype carriage.

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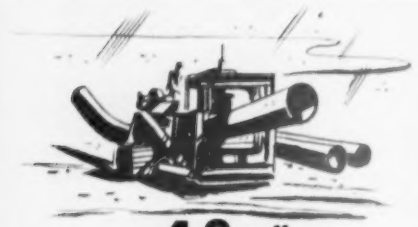

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After each series of characters, the pumping station identifies itself by two code letters. This method of station monitoring gives the dispatcher the operating conditions at each station and provides a record of the conditions.

Station protection . . . To protect the station equipment in the event of abnormal operation a system of lockouts is required. A temporary lockout will occur if:

1. The pump suction pressure should fall below a predetermined amount.
2. The pump discharge pressure becomes excessive.
3. The suction valve or discharge valve fails to open completely during the starting sequence.

This temporary lockout automatically shuts down the station. When conditions have returned to normal the dispatcher can restart the station.

If conditions at the station should exist which require local attention, a permanent lockout of the station will occur. The following are conditions usually classified as requiring permanent lockout:

1. Excessive pump discharge temperature.
2. Excessive pump-gland temperature.
3. Excessive pump-case pressure.
4. Excessive motor-starter temperature.
5. Excessive motor-bearing temperature.
6. Excessive pump-bearing temperature.
7. Excessive sump-tank level.
8. A motor overload.

When a permanent lockout exists at a station, remote restarting cannot be accomplished until a repairman has been sent to the station and the lockout condition corrected. If either a temporary or permanent lockout exists, the pump suction valve is closed, the pump discharge valve is closed, and the pump motor is shut down. However, the pipe-line system can be operated by check valves around that station.

The monitoring system periodically checks all stations and will immediately disclose any shutdowns. In order that the dispatcher can take the proper action when a station is shut down he must know what type of lockout exists. To get this information he dials a fourth number for the station and the station automatically sends back one of three responses by a code of two characters:

1. A temporary lockout exists and no local attention is required.
2. A permanent lockout exists and local attention is required.
3. No lockout exists and the station can be started by dialing the proper number.

A dispatcher equipped with the control and monitoring system just described can operate a complete pipeline system as though he were personally in attendance at each station.

Typical equipment . . . The equipment necessary to supply the functional requirements of an automatic pipe-line system is in general made up of standard components. These components are tied together by a coordinating control panel tailored to the system.

The low maintenance requirement and economic operating cost of an electrical motor-driven pump make it particularly well suited to the application. A constant-speed drive with the flow controlled by the number of stations on the line or by a throttling valve at the discharge side of the pump is suitable to many systems. An alternate method is to use an adjustable-speed electric-motor drive with a liquid slip regulator to maintain the desired flow.

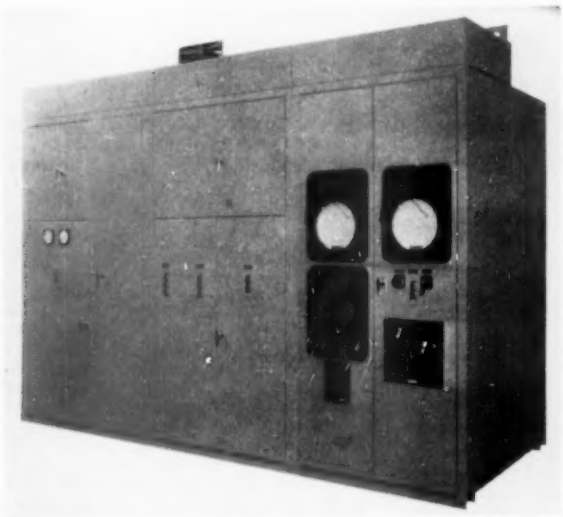


Fig. 2—Control panel consisting of reduced-voltage pump starter, coordinating control, telemetering instruments, and auxiliary equipment.

Because of the magnitude of the horsepower involved, a reduced-voltage motor starter is usually required. Short-circuit protection can be built into the motor-starting equipment by the use of high-voltage, high-interrupting-capacity, current-limiting fuses. Power-factor-correction capacitors may be utilized further to reduce the operating cost.

The suction and discharge valves are properly seated by the use of torque-seating, motor-operated valves. An industrial timing relay is employed to open discharge valves in a period of time consistent with that necessary for the pump motor to reach operating speed.

Control Panel

The control panel consists of the relays, contactors, and timing devices necessary to coordinate the equipments (see Fig. 1 for schematic block diagram of system). A selector switch is required to put the station on local operation so that maintenance and testing can be performed. Seven-day recording instruments record the station's operating conditions.

Temperature and pressure indicators are used to protect the motor and pump equipment. They act through an annunciation circuit which indicates the source of the trouble to the repairman. Lightning-protection capacitors and arrestors are used to protect the equipment.

Auxiliary equipment such as lighting panels, heating controls, sump-pump motor-starting equipment, etc., is often built into the control equipment.

Fig. 2 shows a typical control panel. The left-hand section of the panel houses the reduced-voltage motor starter and current-limiting fuses. Local start and stop push buttons for the pump motor are located on the door of the enclosure. Line voltage and line current are indicated on meters above the push buttons.

The auxiliary equipment is located in the center section of the control panel. The push buttons on this section are for local operation of the suction valve, discharge valve, and sump-pump motors. The right-hand section houses the coordinating control panel and recording meters. The large recording instruments record the suction pressure, discharge pressure, and pump motor current. The annunciator which indicates the cause of a permanent shut down is located on the right door. A transfer switch for local-remote operation and push buttons for local automatic operation are located on the door. A lighting panel is located on the right side of the enclosure.

New A.A.O.D.C. Drilling Report Saves Time

(Continued from page 112)

the actual time shut down for repairs. Repairs made will be shown in remarks.

Coring—Show time involved while actually coring on bottom, pulling wire-line core, removing core, and servicing coring equipment.

Wire-line logging—Show time involved which will include rigging up, tearing down, and running logging equipment.

Other—Any time not listed in the "Time Distribution" breakdown will be entered here, with full particulars shown in remarks.

Fishing—Window by "Fishing" is to include actual hours in each tour from time fishing job occurs until normal drilling is resumed. This time will not be added in the time distribution total of each tour. The time for actual operations should be listed in their proper place in the "Time Distribution" section and explained in the remarks section. The time of such operations that are not listed will be listed in "Other" column here and explained in remarks.

Completing—This section to be used after the oil string is run and cemented. Time waiting on cement should be noted under "Additional" and explained in remarks.

Total—Time distribution breakdown total will be shown here.

Serial numbers . . . Both the daily drilling report form and the accompanying crew time report are intended to be numbered to facilitate matching the time report to the drilling report.

How to Stop Troublesome Pulsation

(Continued from page 117)

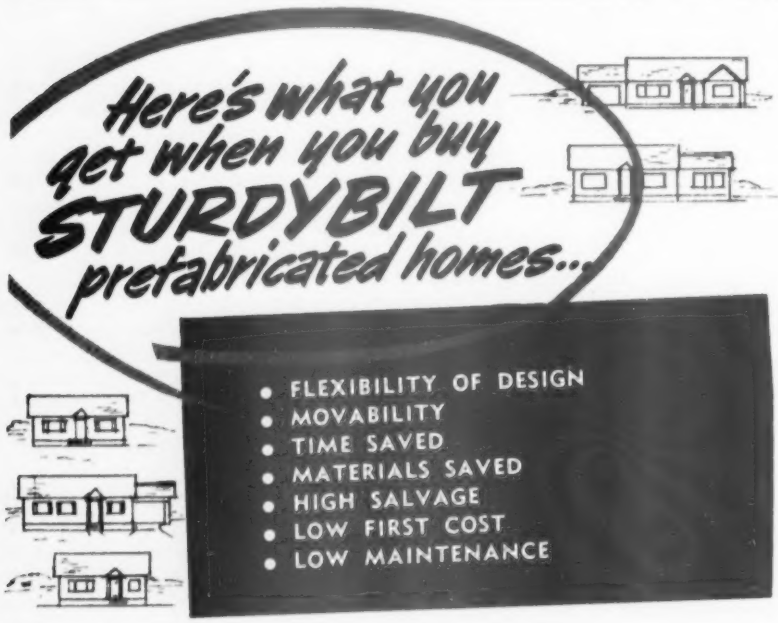
This can be accomplished by the determination of the natural frequencies of all elements that make up the piping system, and redesigning those elements whose natural frequency coincides with the driving frequency of the unbalanced forces; thus, avoiding those pipe elements that are said to be "sensitive to vibration."

The elimination of pulsations and the accompanying noise and vibrational problems is an important advancement in compressor-station design, yet any advancement that must be paid for in increased operational costs over a period of years is of questionable value. Previously this advancement was possible only by accepting higher operational costs in the form of excessive pressure drops. Consequently, the industry has tolerated not only noisy conditions, but also some serious vibrations, in the station piping. However, this new concept of pulsation dampeners may cause many companies to reexamine this problem.

BOOK

OIL AND GAS RIGHTS. By Victor H. Kulp. Published by Little, Brown & Co., Boston. 483 pp., including 1954 Supplement. $15.

This volume has been published to fill the need for a concise and up-to-date book on the legal aspects of oil and gas rights. The author, who is a professor at University of Oklahoma School of Law, contributed a special part on Oil and Gas Law in the treatise, American Law of Property. That original text has been combined with a 71-page supplement on new developments to produce a comprehensive and handy volume on all phases of the subject. An outstanding feature of the work is the emphasis given to the oil and gas lease, the chapter covering the legal capacity of the parties to the lease, the formalities of creating the lease, an analysis of the provisions, the rights of the parties after execution, and such questions as implied covenants. This chapter also offers practical suggestions on drafting.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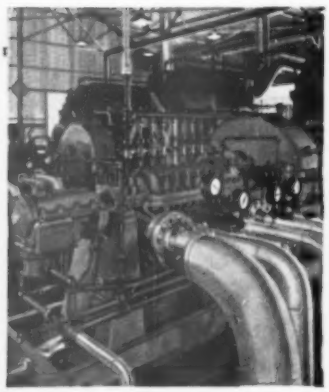
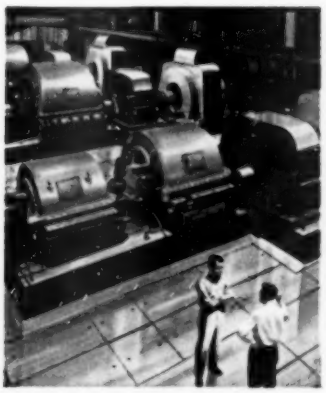
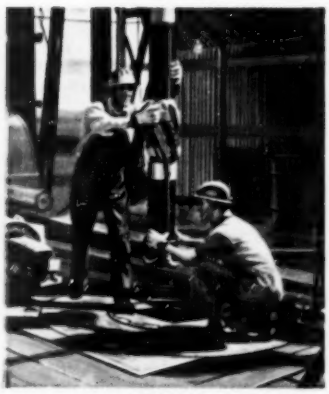


PACIFIC PUMPS, INC., Huntington Park, Calif. Centrifugal pumps, deep oilwell plunger pumps, hot oil and boiler feed pumps.



ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind. Rotary positive blowers, gas pumps, centrifugal blowers, exhausters; positive displacement meters.



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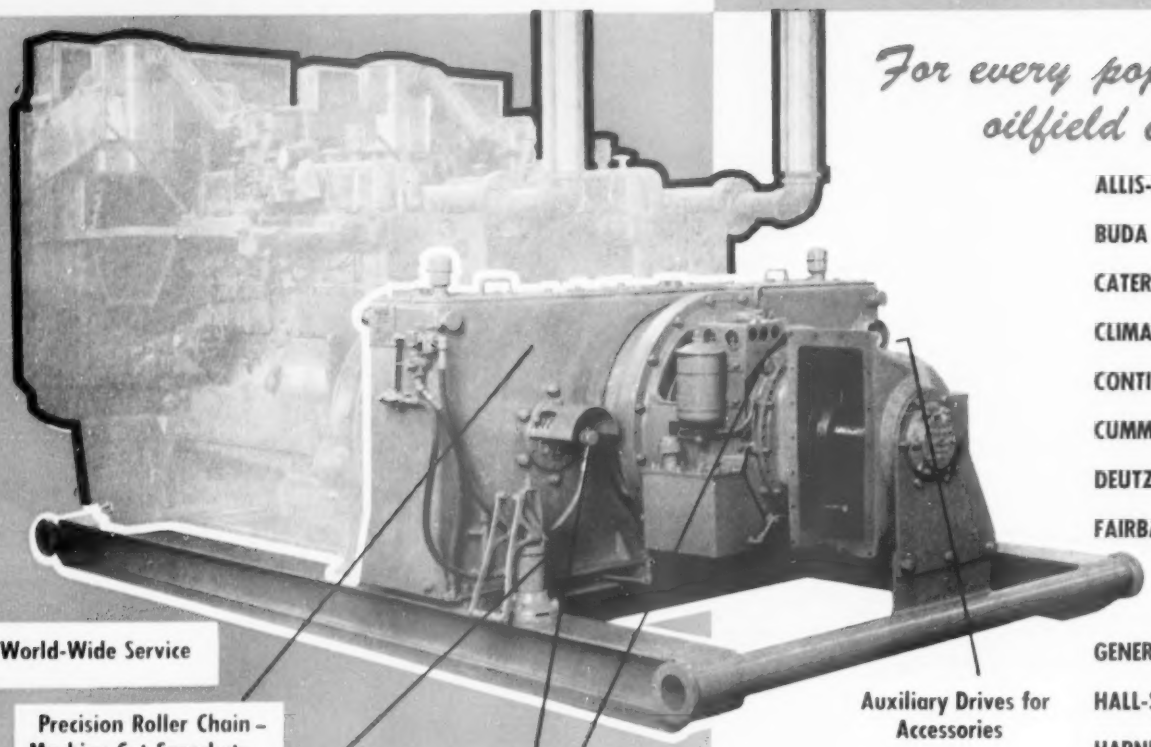

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How to Size Vapor-Relieving Systems—2

by Joseph Conison

CRITICAL flow was discussed in Installment 1. This installment takes up noncritical flow and line sizing.

Noncritical flow . . . For general-purpose calculations under noncritical flow, the correction factor, Kbp, should be applied to Equation 1. Fig. 2, reproduced by permission of Crosby-Ashton, lists the correction factor Kbp versus P_2/P_1, where P_2/P_1 is the ratio of the absolute outlet pressure of the valve to the absolute inlet pressure. For more accurate calculations, the following formula is recommended: (From "Pressure Relieving Systems" by N. E. Sylvander and D. L. Katz):

$$W = 735\ A\ P_1\ C\ (M/T_1\ [k/(k-1)]\ (P_2/P_1)^{2/k}\ [1-(P_2/P_1)^{(k-1)/k}])^{1/2} \quad (3)$$

For practical purposes the absolute temperature, T_2, at the outlet of the valve can be calculated under critical flow conditions from the following formula:

$$T_2 = T_1\ (P_2/P_1)^{(k-1)/k} = T_1\ [2/(k+1)] \quad (4)$$

where:

T_2 = outlet temperature of the valve, °F. + 460

T_1 = inlet temperature of the valve, °F. + 460

Line Sizing

In the selection of the header and the lateral sizes to be used, the following factors must be considered:

1. Maximum vapor-relieving capacity required for design purposes.
2. Maximum back pressure that can be tolerated in the header system.
3. Type of relief valve or valves to be used.
4. Governing code.

After the above items have been established, then the line-size selection is resolved to fluid-flow calculations.

Maximum design capacity . . . This is generally based on the group of valves that may vent the maximum amount of vapor at one time. This condition may be attributed to process or fire, whichever governs in establishing maximum flow. Process selection is based on process variables, such as cooling-water failure, control valve failing in open or closed position, etc. Fire selection is generally based on the number of vessels in an area that may be subjected to the same fire. The radius of the fire zone may vary from 30 to 60 ft. based on a set plant policy, experience, or both. For this application, the plot-plan layout is invariably used and the vessels are zoned in a logical manner.

The maximum back pressure permitted in a header system is based on the lowest design pressure vessel, type of valves used, and the governing code.

Increasing back pressure . . . One method used to increase the permitted back pressure, when standard valves are used, is to lower the setting of a valve below the vessel design pressure. For example: Assume the design pressure of a vessel is 50 psig. and the normal operating pressure is in the range of 5 psig. The relief valve may be set to open in this case at, say, 30 psig., but designed for full rated capacity at 55 psig. [which is equal to 50 + (10 per cent × 50)]. (Note: This valve is assumed to have linear back-pressure characteristics, i.e., a linear increase in back pressure results in a linear increase in relieving pressure above the "set" pressure.) This arrangement will now tolerate a back pressure, due to pressure drop, of 20 psig. as against 5 psig. based on the valve set 50 psig. with 10 per cent accumulation. Consequently, the relief header may be designed for a smaller-diameter pipe and use the same size valve as the one set for the 50-psig. setting.

Another method that can be employed for increasing the back pressure, while also using standard valves, is the procedure mentioned earlier, which is plugging the guide and venting the bonnet. An increase in back pressure will lower the relieving pressure and yet will not overpressure the vessel. This arrangement, however, can upset the process if the valve setting is too close to the operating pressure. Therefore, caution should be used.

The most recent application is the use of balanced valves which permit the back pressure to rise to 25-80 per cent of the set pressure of the minimum designed vessel without any appreciable effect on the relieving pressure in the system. The cost of the valves may be slightly more than the standard type, but the operating advantages plus the flexibility gained will more than compensate the added cost.

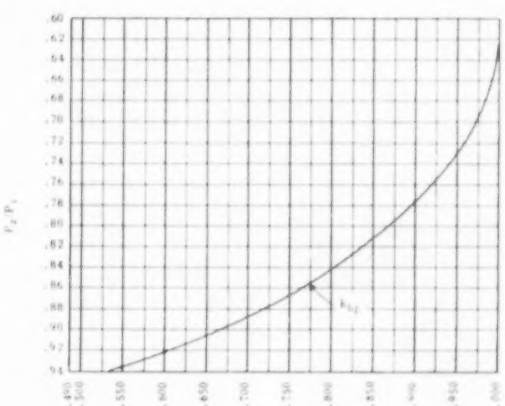

Fig. 2—Correction factor as applied to gases and vapors when back pressure exceeds critical. (To be applied to Equation 1.)

Author is senior instrument engineer with Fluor Corp., Ltd. Paper presented at A.S.M.E. meeting, Los Angeles.

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Effect of Improved Construction Techniques And Processing Methods on Cost Indexes

by W. L. Nelson
Technical Editor

"In connection with your Nelson Refinery Construction Index, what account, if any, is taken of the two following factors:

1. Improvement or changes in processing methods which may cause the cost of a refinery to be larger (or smaller) today than in the past even though the same number of barrels is processed?

2. Improvements in construction technique which may tend to reduce the cost of construction even though the modern plant may be more elaborate than an older plant?" F.E.A.

There is no factor in the Nelson Refinery Construction Index to care for technical advancements or changes that may occur. The index should be used to compare the costs of identical or closely similar plants constructed at different dates. This is, of course, hypothetical because no one would consider the construction of a new but obsolete plant, nor could the builder of say 1925 conceive of a plant as it is built today. However, such improvements both reduce and increase the cost of plants, as:

1. Gasoline finishing may require less equipment today because of the use of gum inhibitors than during 1920-1930 when only white-color stable substantially gum-free gasolines could be sold.

2. Today's catalytic cracking plants cost somewhat more than the thermal cracking plants of a few years ago but the difference is not great because of the greater amount of recycling that is necessary in thermal plants.

3. Lubricating-oil treating plants are today more elaborate than in the past, but the reverse is true of dewaxing plants which today are much less elaborate (or costly).

4. Today very little equipment is used in producing a large volume of middle-distillate or diesel-fuel material whereas very much equipment was needed a few years ago to convert the middle-distillate materials into gasoline.

5. Up to about 1920, enormous investments in shell stills and fractionating towers were necessary whereas after about 1930 the use of pipe-still heaters and multidraw fractionating towers greatly reduced the cost of the topping part of a refinery.

Over-all, a modern refinery probably requires more equipment than a similar older refinery of the same capacity, but generalities regarding this difference would be dangerous if applied to a specific installation. It appears that the effect of changes in processing methods can only be ascertained by a careful study of each refinery installation. Today's plants are more elaborate and are therefore more expensive but at the same time old plants of 1920 were also expensive because of large tonnages of plate steel, enormous furnace settings, and constructions that extended over wide areas.

With respect to the second question, namely, improvements in construction techniques whereby less labor is needed on the site, it is believed that these labor-saving methods are counteracted to a large extent by higher wage rates. At least in our over-all industrial growth, the saving in man-hours of labor due to the use of machinery is handed back to the worker in the form of higher wages. In summary, it is believed that over a prolonged period the use of labor-saving techniques of construction does not reduce the cost but merely permits construction work to be done with the use of less labor. Such a relationship has functioned reasonably well in the United States, but it may not be as immediately effective in some other parts of the world.

Finally, it is felt that the two effects discussed herein, namely, (1) changes in processing methods and (2) improvements in construction techniques, do not greatly affect the validity of construction cost indexes. For a fixed capacity, older plants were probably built at costs somewhat lower than the cost indicated by the Nelson Refinery Construction Index because such plants were simpler than today's (or 1946) plants, but improved construction techniques have probably not resulted in greatly reduced costs, at least in the United States where labor has been the main recipient of much of the saving accomplished by improved techniques.

Increasing Hardness of Petroleum Coke

"The coke from our delayed coker is not strong enough for use in a cupola. How can we harden the coke?"—W.W.S.

It is usually necessary to dry or calcine the coke down to a volatile matter content of about 2 per cent before the coke is strong enough for foundry practice. The hardness measured in terms of the A.S.T.M. shatter test in which lumps of coke are tumbled about is related to the per cent volatile matter, somewhat as follows:

	2-in. lumps remaining
14-18 per cent v.m.	None
8-10 per cent	74-93
2-1	89-93

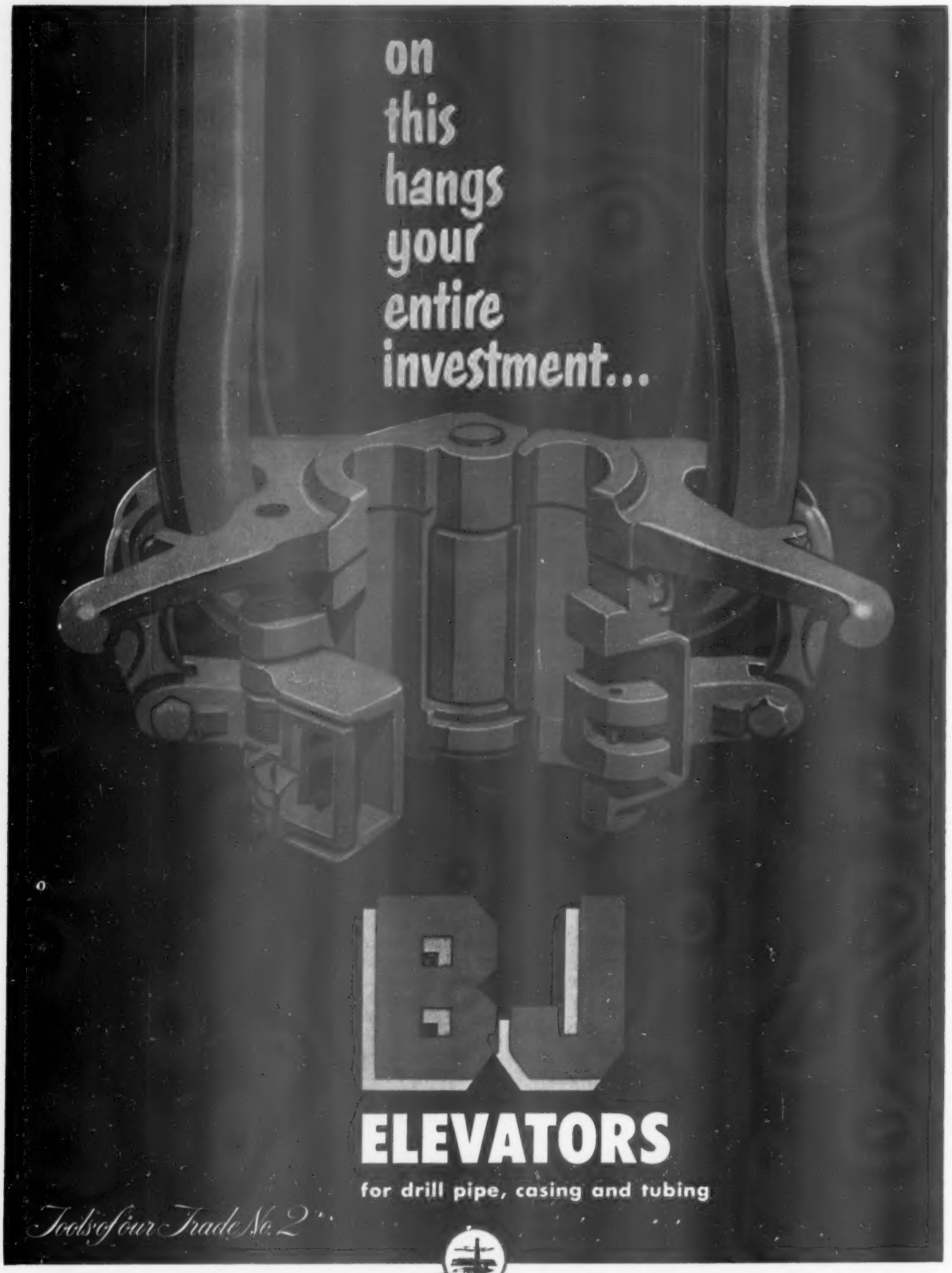
It is doubted that the coke from a delayed-coker operation can be made strong enough for cupola service. However, some of the following changes might be tried:

1. Introduce some cracked fuel oil along with the normal reduced crude feed.

2. Introduce some heavy distillate, preferably cracked, into the system.

3. Maintain a higher coke chamber temperature (raise the transfer line).

4. Allow the coke chamber to stand for several hours before cooling it.



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by R. J. Hull and

K. Raymond

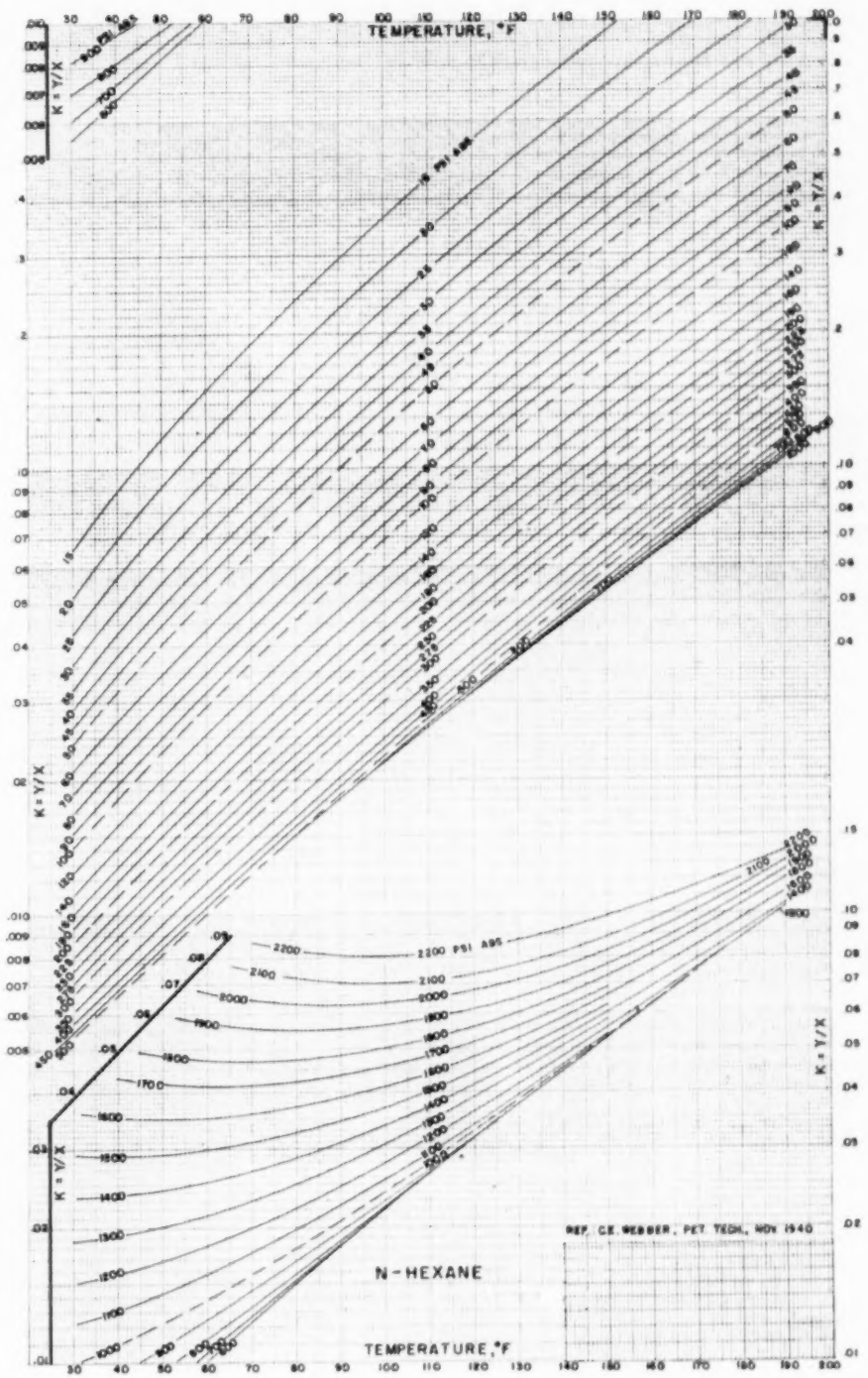
How to Design and Evaluate Absorbers—14

THE complete series of the California Research Corp. method for absorber design and evaluation is being reprinted and will be available soon. Those wishing reprints should address: Editorial Department, The Oil and Gas Journal.

Previous installments in this series have appeared as follows:

1. Nov. 9, 1953, page 163.
2. Nov. 16, page 339.
3. Nov. 23, page 111.
4. Nov. 30, page 101.
5. Dec. 7, page 141.
6. Dec. 14, page 153.
7. Dec. 28, page 101.
8. Jan. 4, 1954, page 97.
9. Jan. 11, page 123.
10. Jan. 18, page 121.
11. Feb. 1, page 95.
12. Feb. 15, page 183.
13. Mar. 1, page ——.
14. Mar. 15, page ——.

Authors are with California Research Corp., Richmond, Calif. Paper presented at California Natural Gasoline Association meeting, Los Angeles.



Equilibrium constants for n-hexane. Reference: C. F. Webber, Pet. Tech.: November 1940.

B. of M. Survey of Aviation Gasoline and Jet Fuels, 1953

by O. C. Blade

COMMERCIAL aviation gasolines produced in the United States during 1953 did not vary greatly from those produced during 1952. A number of grades of aviation jet fuel were produced during 1953, almost entirely for military purposes.

In the survey of aviation gasolines and jet fuels by the Bureau of Mines in cooperation with the American Petroleum Institute, laboratory tests were made by 21 manufacturers on typical samples of their production of aviation gasoline for commercial and military use and on samples of aviation jet fuel.

Commercial Aviation Gasolines

Average octane ratings of 78 commercial aviation gasolines by lean and rich-mixture testing methods, respectively, were 81.8 and 87.7 for grade 80/87 gasoline, and 92.5 and 98.4 for 91/96 gasolines. Average performance numbers were 106 and 131 for 100/130 gasolines, 118 and 146 for 115/145 gasolines and 111 and 136 for the relatively recent fuel, 108/135 for the lean and rich-mixture methods, respectively.

Average octane numbers, TEL contents, performance numbers, Reid vapor pressures, distillation temperatures, slopes at 10 per cent evaporated, and kinematic viscosities of the commercial aviation gasolines are shown in Table 1.

Charts included in the report (Bureau of Mines, R.I. 5036, "National Annual Survey of Aviation Gasoline and Aviation Jet Fuel, 1953 Production") indicate trends of certain characteristics of the fuels during recent years.

Other test data tabulated in the report include copper-dish gum, potential gum, visible lead precipitate, water tolerance, net heat of combustion, aniline point, freezing point, sulfur content, color of fuel, copper strip corrosion, and acidity of distillation residue. (See also The Oil and Gas Journal, July 6, 1953, page 95.)

Military Fuels

Similar data on samples of aviation fuel produced for military use are included in the analytical tabulations.

Analyses of 32 samples of aviation jet fuel are given in the report. The data are listed for three grades and for a referee fuel. A summary of the tests compared with similar data for jet fuels of 1952 is shown in Table 2. (For more on jet fuels see The Oil and Gas Journal, January 5, 1953, page 85, and January 12, 1953, page 119.)

Author is with U. S. Bureau of Mines, Bartlesville, Okla.

TABLE 1—COMPARISON OF SOME AVERAGE DATA FOR COMMERCIAL AVIATION GASOLINE

	Grade 80/87		Grade 91/96		Grade 100/130		Grade 108/135		Grade 115/145	
Test—	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953
Octane number:										
Lean mixture	81.7	81.8	93.0	92.5	*0.16	*0.15	*0.28	*0.34	*0.58	*0.59
Rich mixture	87.7	87.7	98.7	98.4	*1.36	*1.35	*1.79	*1.76	*2.96	*2.88
Tetraethyl lead, ml. per gal.	0.53	0.52	3.99	3.96	4.05	4.05	2.94	2.99	4.55	4.56
Performance number:										
Lean mixture					106	106	110	111	118	118
Rich mixture					131	131	136	136	146	146
Reid vapor pressure, lb.	6.5	6.4	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.5
D86 distillation temp., °F.:										
10 per cent evap.	147	148	147	148	149	148	153	148	150	148
50 per cent evap.	191	191	193	192	204	204	214	212	213	212
90 per cent evap.	236	237	236	236	245	246	248	246	247	246
Slope at 10 per cent evap.	1.7	1.6	1.7	1.8	2.0	2.1	2.7	2.3	2.5	2.4
Visc., kinematic, 70° F., cs.	0.611	0.609	0.619	0.616	0.635	0.627	0.627	0.643	0.651	0.637

*Isooctane plus.

TABLE 2—SUMMARIZED DATA ON AVIATION JET FUELS

	1952				1953			
Inspection test—	Grade JP-1	Grade JP-3	Grade JP-4	Grade JP-4	Grade JP-3	Grade JP-4	Referee JP-4	Grade JP-5
Number of fuels	3	6	24	1	*1/2	28	1	1
Gravity, °A.P.I.	42.3	52.5	50.5	45.6	55.6 and 5.7	52.1	45.4	37.3
Distillation temp., °F.:								
10 per cent evap.	338	166	222	238	165 and 194	220	240	397
50 per cent evap.	368	316	332	348	301 and 340	324	349	432
90 per cent evap.	421	433	430	455	446 and 426	421	461	491
Reid vapor pressure, lb.		6.0	2.6	2.3	5.7 and 5.5	2.5	2.2	0.5
Freezing point, °F.	<—76	<—76	<—76	<—76	<—76 and <—76	<—76	<—76	—54
Viscosity, kinematic, —40° F., cs.	8.59		4.18	3.73	— and 3.26	3.68	3.80	19.4
Water tolerance, ml.	0.0	0.0	0.0	0.0	0.0 and 0.0	0.0	0.0	0.0
Aniline point, °F.		123.9	133.9	110.8	132.9 and 124	134.8	106.5	136
Bromine No., gm. Br. per 100 gm.	1.57	2.30	1.91	13.0	1.52 and 1.54	1.63	19.6	4.3
Sulfur:								
Total, wt. per cent	0.057	0.081	0.075	0.301	0.077 and 0.048	0.074	0.265	0.46
Mercaptan	0.0017	0.0010	0.0010	0.003	0.003 and 0.001	0.0014	0.003	0.003
Aromatic content, vol. per cent	14.3	14.7	11.9	20.4	12.3 and 16.0	11.9	20.3	8.3
Gum:								
Existent:								
Air-jet, 400° F., mg. per 100 ml.	1.7	0.9	1.2	3.8	0.7 and 0.4	1.3	2.8	3
Steam-jet, 450° and 500° F.					— and 0.4	0.7		2
Accelerated:								
Air-jet, 400° F.	1.5	5.9	3.3	19.0	1.5 and 2.9	2.9	13.4	5
Steam-jet, 450° and 500° F.					— and 2.4	1.7		4
Heat of combustion, net, B.t.u. per lb.	18,551	18,642	18,671	18,452	18,716 and 18,555	18,714	18,467	18,474
Hydrogen-carbon ratio					— and 0.1575	0.1649		0.159

*As only two samples are represented, average values were not computed.

1. How to Improve Cooling-Tower Water-Supply Treatment

. . . with automatic control

by J. W. Segraves

A STRIKING example of the destructive nature of improperly handling water is found at the Tinker Air Force base, Oklahoma City, the world's largest jet-engine-overhaul center and headquarters for Oklahoma City's Air Material Command. According to the Air Force engineers, replacement costs for pipe alone, in the recirculating system, ran over $80,000 in a 10-year period. In addition a 42-in. main had to be replaced—itself a costly project. The pipes and the main were damaged despite conscientious water treatment by best-known methods then available.

To do a more effective job of water treating, a completely automatically controlled cooling-water-treatment system has recently been installed at the Tinker base.

The problems at Tinker Field are similar to those encountered in other installations. At peak loads, approximately 30,000 g.p.m. of water is recirculated. Raw water is alkaline, having a pH of 8.1 and a total hardness of 210 p.p.m. More than $1,500,000 worth of equipment had to be protected, and replacement and operating costs had to be reduced. Manual chemical treatment supplemented with periodic laboratory checks was not adequate. Tinker engineers decided to make maximum use of automatic controls, even automatically controlling the addition of sodium dichromate.

The instrumentation consists of four separate measuring and control systems, namely: (1) a continuous pH measurement and control system; (2) a system which continuously measures and controls the sodium dichromate at 250 p.p.m. to inhibit oxidation; (3) a system which automatically and continuously measures and controls, by means of a continuous blowdown, the concentration of dissolved solids; and (4) the control of makeup to maintain the desired quantity of water in the circulating system.

Author is industry engineer, Minneapolis-Honeywell Regulator Co.

Control Is Complete

The pH system consists of an electronic pH recording and controlling potentiometer, a pH flow-through electrode assembly and amplifier, and a proportioning pump. This system continuously measures and records the pH of the water and accurately controls it at a pH of 6.5 to 6.8 by the addition of minute amounts of sulfuric acid. The e.m.f. signal received by the potentiometer from electrode assembly and amplifier varies according to the pH and is translated into corresponding air signals which vary from 3 to 15 psi. and which, by means of a pneumatic-electric relay and an electron tube control unit, are in turn translated into proportionately varying pump speeds.

The controlled feeding system for the oxidation inhibitor consists of an electronic recording and controlling potentiometer used in conjunction with a flow colorimeter and a proportioning pump. The colorimeter is a convenient and accurate primary element for continuously measuring the sodium dichromate concentration in the cooling water. It is operated directly from a 115-volt, 60-cycle, a.c. power source and consists of a 5-cm. glass sample cell with inlet and outlet ports, two blue-sensitive phototubes, tungsten lamps, cooling cells, shutters, electronic amplifier and filters to isolate the spectral band of sodium dichromate. It has an e.m.f. output signal varying from 0 to 50 mv., depending on the concentration of the dichromate in the water flowing through the cell. This signal is fed to the potentiometer which records concentration in parts per million and controls the pump the same way the acid pump is controlled. Concentration of sodium dichromate is maintained at 250 ± 5 p.p.m.

Controlled additions of sulfuric acid and sodium dichromate prevent corrosion, bacteriological attack of wood, biofouling of pipes, and formation of scale in the cooling-water system; however, control of sludge formation and of dissolved solids is also necessary to reduce maintenance costs to a minimum and increase heat transfer efficiency.

Blowdown Is Continuous

Concentration of dissolved solids is continously measured by a conductivity measuring system based on the principle that the conductance of a solution is a function of the concentration of dissolved electrolytes. An electronic circular chart, recording and controlling potentiometer receives an a.c. signal from the conductivity cell and in turn not only continuously records the dissolved solids content but also pneumatically operates a diaphragm motor valve in a blowdown line. This controlled blowdown system minimizes excessive waste of water and results in considerable savings in chemical costs.

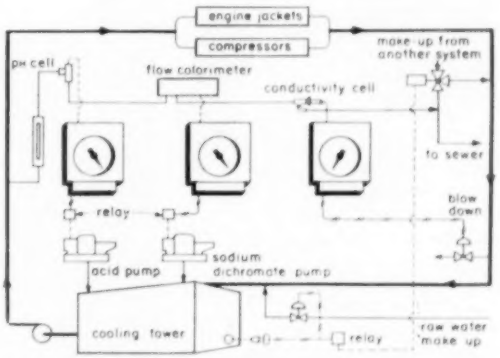


Fig. 1—Schematic diagram of control system for cooling-water treating installation.

One-piece packing rubber molded from special compound gives positive pack-off, yet pulls easily and will not vulcanize to casing wall.

Two-piece "G2" rubbers with metal spacer are interchangeable and optional at no extra cost.

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Perforated-Mandrel Control Head Packer

The KV30P is designed especially with a perforated mandrel for free fluid circulation ***ABOVE*** the packer when valve is open. Special seal in shell prevents circulation through the packer shell. Positive pack-off is obtained when valve is closed. Two independent sealing elements in the valve, a tapered metal valve and seat and a set of oil-resistant seal rings, afford double-sealed protection.

Both the KV30P and the regular KV30 allow a 30" opening valve stroke before packer setting is disturbed. Use the KV30 or the KV8 for standard below-packer circulation. The KV8 is the same packer as the KV30 but with 8" valve stroke. All three packers have the same husky construction, varying only in point of circulation and length of valve stroke.

With these KV Packers you can *conserve* gas pressure... *extend* the flow life of your well and produce at *lower lift cost*.

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ELECTRIC LOGGING—22

Departure and Lateral Curves

by R. I. Martin

FIG. 1 shows a log of a thick sand which is oil bearing in the upper part. Since this section is more than 90 ft. thick, it may be considered to be infinitely thick so far as the use of departure curves is concerned. The sand is obviously invaded.

In this case:

Rm, mud resistivity (corrected for temperature) = 0.6 ohm-m.

d, hole diameter = 8 in.

Spacings AM = 16 in.
AM' = 64 in.
AO = 24 ft.

The average resistivity values recorded by the normals are 9.2 ohm-m and 6.2 ohm-m.

Hence the values related to hole diameter and mud resistivity are:

$$AM/d = 16/8 = 2$$

$$AM'/d = 63/8 = 7.9$$

$$Ra/Rm = 9.2/0.6 = 15.8$$

$$Ra/Rm = 6.2/0.6 = 10.3$$

In this case the approximate value of the formation factor is known from cores.

A portion of the departure curves for Ri/Rm is shown in Fig. 2. The above values are plotted on this chart and fall between the curves for Rt/Rm = 21, and Rt/Rm = 4.2, Di/d = 2. They are much closer to the latter curve and it appears that Rt/Rm should be somewhat higher than 5. Rt is therefore a little higher than 5 × 0.6 or 3 ohm-m.

Consider now the lateral curve. The spacing AO = 24 ft. is about one-fourth of the thickness of the oil-bearing section, so that the thickness may be considered to be infinite. Ra in this case is 3.9 ohm-m. so that Ra/Rm = 3.9/0.6 = 6.5. Reference to Table 1 of the previous installment shows that 6.5 is within an interval where Ra is not more than 20 per cent different from Rt. Hence Rt may be as high as 3.9 ohm meters.

Considering both the normal and lateral devices it is likely that R_T is within the range of 3.0 to 3.9 ohm-m.

The preceding example is a comparatively easy one. Such thick beds are seldom encountered in practice, so that more general cases will be considered in coming installments.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

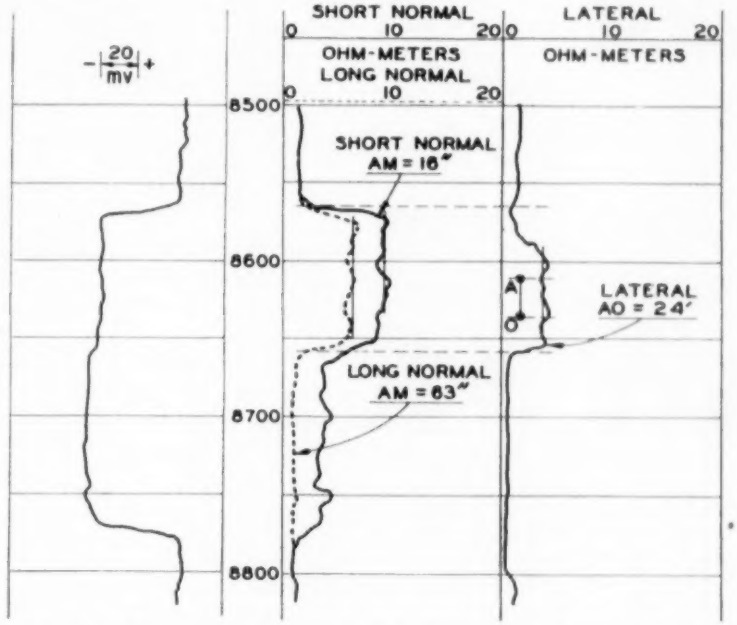

Fig. 1—In this field example of a sand which is oil bearing in the upper part, an invasion of the formation may be detected. (Schlumberger Well Surveying Corp., Document 4.)

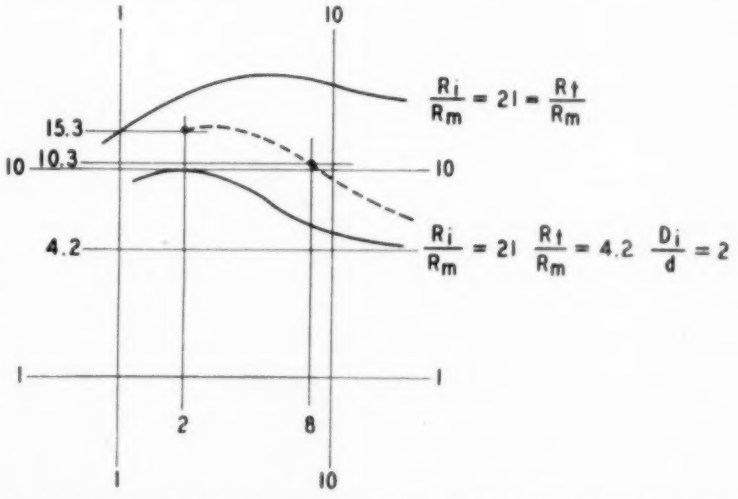

Fig. 2—In this portion of the departure curves for Ri/Rm = 21, interpolation is required for the example. (Schlumberger Well Surveying Corp., Document 4.)

EQUIPMENT MEN . . . in the News

Oilwell Announces Three Major Sales Appointments

K. B. WINSTEAD

Three major sales department appointments and the establishment of a new sales position in U. S. Steel's Oil Well Supply Division have been announced by Lloyd E. Tracy, vice president, sales.

K. B. Winstead, Oilwell's general manager of sales, was named assistant vice president, sales. The new post is that of director of

G. A. HAYS

F. D. SMITH

product sales which will be filled by George A. Hays, formerly director of market development. In the third appointment, F. D. Smith was named assistant to vice president, sales.

In his new position, Winstead will assist in working with the field organization in coordinating the division's sales program. Hays will be responsible for coordinating the activities of the product managers in developing and meeting sales goals. Smith will coordinate the office activities of the general sales department's line organization.

Winstead is a veteran of 33 years' service with Oilwell. Starting as a stock record clerk at Fort Worth in 1921, he advanced through various field sales positions and was district manager at Breckenridge, Wichita Falls, and Longview, Tex. He came to the division's headquarters at Dallas in 1939, and 4 years later was promoted to Midwest area manager. He was named manager of the present Central Midwest area when it was created in January 1946, and in January 1948 he became the division's assistant general manager of sales. He was elevated to general manager of sales in January 1950.

Hays joined Wilson-Snyder Manufacturing Corp. in 1922 as a sales engineer. In 1927 he was named sales manager of the firm, which in 1929 was acquired by Oilwell. In 1936 Hays moved to Oilwell's headquarters at Dallas as manager of machinery sales.

Smith started with Oilwell 26 years ago, and has occupied various sales and management positions both in the field and at the home offices. He was located at Dallas from January 1944 to May 1948 when he transferred to Houston as manager of the Gulf Coast area. He returned to the general sales department at Dallas in 1952 as assistant to general manager of sales.

Corona Appoints Newton

A. B. Newton has been appointed sales representative for Corona Oil Specialties Co. for West Texas and New Mexico. He is stationed in Midland, Tex.

Richardson Rejoins Oil Base, Inc., at Compton

After 6 months' duty with Halliburton Oil Well Cementing Co. as a laboratory chemist at Duncan, Okla., H. P. Richardson, Jr., has rejoined Oil Base, Inc., makers of Black Magic and a line of oil-base and emulsion drilling fluids. He will serve as a sales engineer in the Mid-Continent area working out of Duncan.

Richardson received a B.A. in chemistry at Texas Christian University. For 3 years he was an assistant in the Oil Base, Inc., laboratory at Compton, Calif., before joining Halliburton.

Lane-Wells Holds Sales Convention in Galveston

More than 100 Lane-Wells Co. sales engineers, district superintendents, and field representatives met in Galveston, Tex., to plan and evaluate 1954 sales possibilities.

Under the direction of James D. Hughes, Lane-Wells general sales manager, classes in perforating, logging, and merchandising sales were held. New features of Lane-Wells services and products were demonstrated by outstanding engineers and sales representatives. The Galveston meeting was the eleventh general sales convention held by Lane-Wells during the past 17 years.

"Petroleum industry activities will be greater than ever," Rodney S. Durkee, president of Lane-Wells Co., told the sales force, "and the service companies will have to work harder to satisfy the demand for top quality technical field services. The year 1954 will be the best year in history for the petroleum industry, but producers will have to dig for the business."

Four sessions, held simultaneously, were attended by not more than 30 individuals each. This plan, instituted by Hughes, enabled each sales engineer to get answers to the particular problems in his own territory.

Lane-Wells officials discuss sales plans for 1954. Left to right: John J. Neale, assistant to the president; Morton T. Higgs, vice president, field operations and sales; Rodney S. Durkee, president; and Russell M. Otis, vice president, engineering, research, and patents.

Consolidated Engineering Forms Computer Subsidiary

P. S. FOGG

J. R. BRADBURN

Announcement by Philip S. Fogg, president, Consolidated Engineering Corp., of the formal establishment of ElectroData Corp. as a new wholly owned Consolidated subsidiary, brought a veteran designer and manufacturer of electronic digital computers into the electronic data processing field under a new name.

ElectroData Corp. with headquarters in Pasadena, Calif., will continue engineering, manufacturing, and sales activities formerly conducted by Consolidated's computer division.

Named to head the new corporation was Philip S. Fogg, president. Fogg will continue as president and chairman of the board of the parent company. Other officers are: James R. Bradburn, executive vice president L. P. Robinson, vice president; Victor J. Pollock, secretary-treasurer; and Joseph B. Rice, assistant secretary-treasurer.

Bradburn, who as executive vice president will direct operations of the new corporation, served in a variety of engineering and administrative posts with General Electric Co. and Eastman Kodak Co. before joining Consolidated in 1945 as treasurer and assistant to the president. In 1946 he was named director of sales and vice president in charge of commercial engineering, and subsequently served as vice president and director of engineering. In December 1953 he was made vice president and director of Consolidated's computer division.

Robinson was also associated with the computer division and directed much of the original research and engineering work of the company's computer group. Pollock serves as secretary-treasurer of the parent corporation in addition to his new post with ElectroData.

BJ Service, Inc., Promotes Kirkpatrick and Lamkin

John B. Merritt, executive vice president of BJ Service, Inc., has announced the following changes in the company's Rocky Mountain division.

R. P. Kirkpatrick, formerly service

SIMPLICITY AND STRENGTH

Emsco combines every feature long desired in this, the finest development in Ball Bearing Swivel Fittings. Exceptionally easy turning under heavy pressure or physical loading is an outstanding advantage. Remarkable sealing against leakage and easy servicing when needed prolong the usefulness of these fittings. Backed by Emsco, this excellent product is available for all services in a complete range of styles and sizes.

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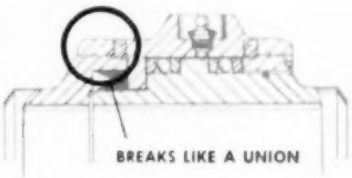

When making inquiries or when ordering, simply tell us the nature of your application, the fluid, temperature and type of end connections required. Complete information awaits you.

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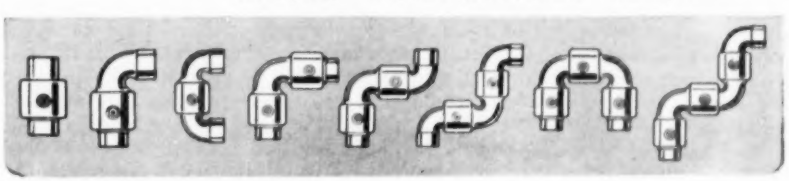
Houston, Texas LOS ANGELES 54, CALIF. Garland, Texas



supervisor of the Tioga, N. D., station, became district superintendent of the Williston basin district, which includes all stations and oil well service activities centered at Williston, Harvey, and Tioga, N. D., and Wolf Point and Glendive, Mont. The district office is located at Williston.

At the same time, Merritt revealed the promotion and transfer of Howard N. Lamkin, formerly service engineer at the Ventura, Calif., station, to Worland, Wyo., as service supervisor.

Both Kirkpatrick and Lamkin will assume their new posts immediately.

Other recent changes within the organization include moving the Rocky Mountain division office from Casper, Wyo., to Billings, Mont. Casper remains an operating service station. The Rocky Mountain division manager is John Buster. Rocky Mountain division sales supervisor is Paul Whitaker.

Propane Successfully Used In Large Diesel Engines

At the annual winter meeting of Iowa Association of Municipal Utilities at Des Moines, Glen V. Yarger, superintendent of municipal utilities, Waverly, Iowa, told of the successful completion of tests in burning propane in Worthington four-cycle supercharged dual-fuel diesel engines. This is the first announced successful application of commercial propane fuel use in large diesels at diesel compression ratio with a minimum pilot oil consumption of approximately 5 per cent.

Successful operation using propane at Waverly started on January 29, 1954. Fuel consumption was better than guarantees made for the same engines operating on natural gas with a minimum consumption of pilot oil. With the improved economy, and considering savings on costs compared to diesel fuel delivered, Yarger stated that he is saving 20 per cent in fuel costs.

Fox Made Drilling Mast Engineer by Emsco

C. L. FOX

Charles Leroy Fox has been appointed drilling-mast sales engineer, Emsco Manufacturing Co., it was recently announced by William C. Kinder, vice president and general manager, sales.

Fox has had many years' experience in the design and construction of drilling masts and other oil-field structures. Prior to joining Emsco, he was presi-

Officials of Continental Supply and associated manufacturing companies took time out from the official business of Continental Supply's fourteenth annual sales meeting to let the cameraman take these pictures. In the picture at left are: J. L. Mauthe, president, The Youngstown Sheet & Tube Co., and Frank I. Brinegar, executive vice president, Continental Supply Co. Center are: R. J. Bauer, division manager, Gardner-Denver Co., and Jack Mussler, general manager of sales, Continental Supply. At the right are: W. C. Kinder, vice president, Emsco Manufacturing Co.; L. E. Wallace, assistant vice president, The Youngstown Sheet & Tube; and Dan Bailey, vice president and general counsel, Continental Supply.

Continental Holds Sales Meet

Continental Supply Co. held its fourteenth annual sales meeting in Dallas, February 28, March 1 and 2. The theme of the meeting was "Aggressive Selling" and continuing improvement of service. The Monday morning sessions were conducted by representatives of Continental's associated manufacturers, at which time they explained and discussed new products and manufacturing methods.

The balance of the meeting was a series of panel discussions for the Continental representatives, conducted by heads of the several departments, such as drilling, production, and tubular goods divisions.

In attendance were 260 Continental field and Dallas office men, including all management and district, division, and local store personnel also 100 representatives from Continental's associated manufacturers.

Among the associated companies' officials present was J. L. Mauthe, president of The Youngstown Sheet & Tube Co. Other leading men in the petroleum equipment manufacturing field that participated in the meeting were: J. H. Bascom, executive vice president, Broderick & Bascom Rope Co. Brinton Welser, vice president, Chain Belt Co.; T. Bruce Cox, manager union sales, Clayton Mark & Co.; W. T. Powell, president, Emsco Manufacturing Co.; J. V. Leece, vice president, Gardner-Denver Co.; J. F. Hacker, vice president, Ladish Co.; Paul M. Arnall, president, The Lunkenheimer Co.; Bob Snyder, vice president, New Bedford Cordage Co.; Joe A. Conlon, vice president, New York Belting & Packing Co.; Roy Bush, Nordstrom Valve Division, Rockwell Manufacturing Co.; and H. H. Peters, president, Technical Oil Tool Corp.

One of the outstanding social events was the annual 25-Year Club reception and dinner held Sunday evening. Noble A. Endicott, vice president in charge of Gulf Coast operations, Houston, was elected president for 1954. Charles H. Fischer, Evansville, Ind., and Ralph R. Lewis, Dallas, were presented 40-year pins during the dinner.

Frank I. Brinegar, executive vice president, extended the welcoming message to all Continental men and representatives of other companies, and presided through the several meetings.

dent of Fox Diamond Derrick Co., Fort Worth. Fox will have headquarters in Emsco's Dallas offices.

Clark Bros. Opens New Shreveport Sales Office

The opening of a new sales office at Shreveport has been announced by Clark Brothers Co., Olean, N. Y., manufacturers of compressors and turbines for the gas, petroleum, chemical, and general industry. James R. Hutton has been named sales engineer for the new office. A Texas University graduate with degrees in both petroleum engineering and business administration, he was transferred from the Clark Houston office, where he had been employed for 4½ years.

Bantrell Names Davidson As Filtrol Sales Manager

R. C. DAVIDSON

Myron A. Bantrell, president of Filtrol Corp., Los Angeles, has announced the appointment of Robert C. Davidson as sales manager, succeeding the late Stanard R. Funsten.

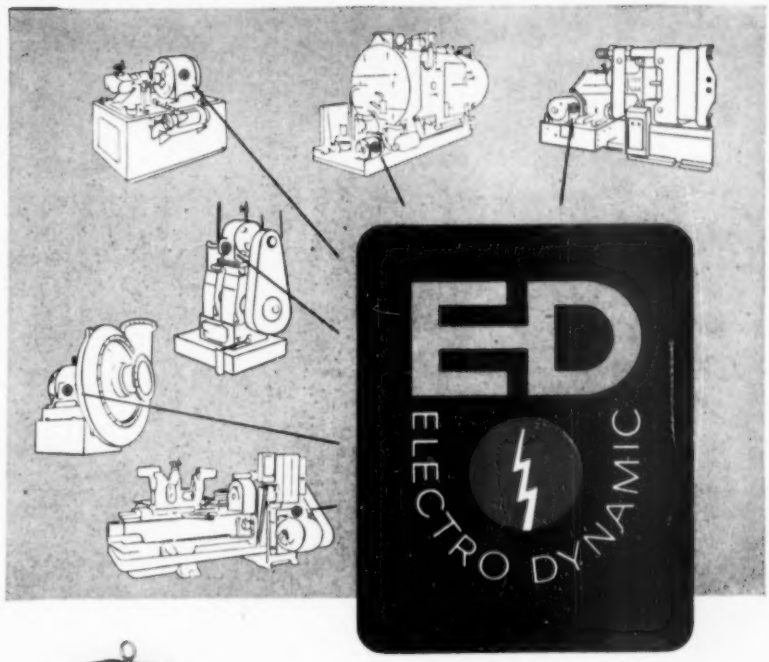
To give better service to Filtrol customers, sales and service representatives have been assigned as follows: H. D. Bartholomew and L. L. Richardson, Chicago; Gerald Mansfield, Denver; Walter Kitchens and J. E. Leehey, Houston; George Benck, Jackson, Miss.; M. J. Kerchner and J. D. Barton, Los Angeles; I. A. Schwint, Wilmington, Del.; and L. C. Trescott, Woodbury, N. J.

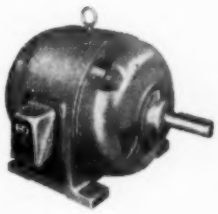
Filtrol is a major producer of catalysts, adsorbents, and desiccants. With the completion of its new $6,000,000 chemical plant, it is offering the trade high-quality aluminas, magnesia, and calcium sulfate.

Solon Named Assistant to Glass Fibers President

Faustin J. Solon, Jr., vice president, Glass Fibers, Inc., has also been appointed assistant to the president of the company in charge of public and trade relations, according to an announcement by R. H. Barnard, company president.

In his new position, Solon will have full responsibility for development of





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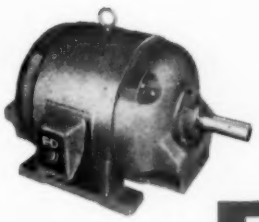

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Here Are Typical Physical Properties of Jones Type 7 Sucker Rods

Yield (p.s.i.)	70,000
Ultimate (p.s.i.)	86,000
% Elong. 8"	20.0
% Red. of Area	65.0
Brinell Hardness	190
Charpy Impact	50
Izod Impact	98

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LOOK FOR THE GREEN RODS

the trade-relations department, a new marketing function with the company. He will also continue previous public-relations activities. Solon has been with Glass Fibers since 1947 in merchandising, sales, and advertising capacities.

Harbison-Fischer Appoints Three New Representatives

DON DYE

Harbison-Fischer Manufacturing Co., Fort Worth, has announced the appointment of three new sales representatives. They are Don Dye, L. E. (Sam) Johnson, and W. R. Forcum.

Dye, who will represent the company in its Houston territory, joined Harbison-Fischer sales staff after working in the production

L. E. JOHNSON

W. R. FORCUM

departments of The Texas Co., Gulf Oil Corp., Humble Oil & Refining Co., Pure Oil Co., and Wilson Supply Co.

Sam Johnson, whose headquarters will be in Midland, Tex., was associated with producers, contractors, suppliers, and manufacturing companies in West Texas, the Panhandle, and North Texas for many years.

W. R. Forcum, who will work out of Denver, has had extensive experience in the Rocky Mountain region. He has represented The Guiberson Corp., Gearench Manufacturing Co., and Grove Regulator Co.

Raasch Joins Denver Sample Log at Calgary

Dr. Gilbert O. Raasch has joined the staff of Denver Sample Log Co. as paleontologist at the office of its Canadian subsidiary, Canadian Stratigraphic Service, Ltd., Calgary, Alta., where he will do paleontological research for the entire company with emphasis on the Williston basin and western Canada.

Raasch received his B.S. and Ph.D. degrees from University of Wisconsin where he spent 7 years as curator of the Geological Museum. For the past

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One man with a Safety-Pull Ratchet Lever Hoist does the lifting, pulling, holding work of many — in shop or field. Even the smallest Safety-Pull, weighing only 14 lb., delivers a 1500-lb. vertical or horizontal pull — is ready to go to work wherever hooked. Lifting pipe, pulling rod lines, stretching guys — these are but a few of the jobs it handles easily, safely.

All Safety-Pulls are tested at 100 percent overload. Dual ratchet and pawl construction cannot slip—holds securely in any position. Choice of nine sizes with capacities up to 30,000 lb. Send for Bulletin F3SP.

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● These arrestors combine the desired flame stoppage and explosion prevention with minimum pressure drop. Sturdy, rugged semi-steel housings and covers. Corrosion resistant aluminum "banks" have vertical straight through passages, minimizing clogging and simplifying inspection;— extensible for easy cleaning. 2" to 10" sizes. *Write for Bulletin No. 471-R. It gives full details.*

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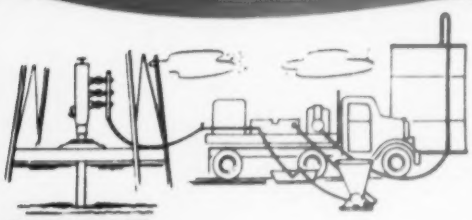
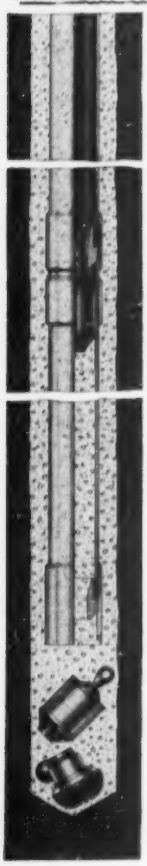


and Here's Why!



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1. Complete and positive segregation of cement between the two tight-fitting plugs.
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3. Full Casing Discharge. Ejection of float assembly from shoe provides unrestricted opening, reduces load on pumps, permits greater discharge volume.
4. Positive Flow-Back Control is assured when top plug latches in stall collar.
5. Wiping action on casing is provided by lips on both plugs.

It will pay you to get complete information about the Rector Fulbore Method of cementing before your next cementing job . . . also about our new Two-Plug Stage cementer for your next stage job.

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REPRESENTATIVES IN ALL ACTIVE FIELDS

RECTORHEAD RECTOR FULBORE METHOD RECTORSEAL

7 years he has carried on paleontological and stratigraphic studies in addition to being in charge of educational and publicity work at Illinois State Geological Survey.

Bolin Made Westinghouse General Advertising Head

Roger H. Bolin has been appointed manager of general advertising for Westinghouse Electric Corp., it has been announced by J. H. Jewell, vice president.

Bolin succeeds Harry J. Deines, who leaves the company to accept a position as vice president of J. Walter Thompson advertising agency in New York.

Well known in advertising circles, Bolin has pioneered the adoption of many advertising techniques and directed the Westinghouse television sponsorship of national collegiate football, professional football, as well as the national political campaign coverage in 1952.

Bolin began his career with Westinghouse in 1925 upon graduation from Rose Polytechnic Institute, where he received a bachelor of science degree in electrical engineering.

Within a few years after joining the company's advertising department as a graduate student trainee, he was supervising Westinghouse refrigeration and air conditioning advertising. In 1937 he was named advertising manager of Westinghouse Appliance Division.

In 1949 Bolin was appointed assistant to J. M. McKibbin, vice president and general manager of Westinghouse consumer products divisions, from which duties he comes to his present assignment.

Los Angeles Nomads Gavel Goes to John Flanagan

John Flanagan of Johnston Testers, Inc., president (left) being congratulated by James D. Hughes, of Lane-Wells Co., retiring president, at the fifteenth annual inaugural ball of the Los Angeles Chapter of Nomads, February 20, 1954.

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Our planes and pleasure cars . . . our farms and factories . . . our prosperity and our national progress owe their continued development to oil. Helping in the search for new oil resources are the Schlumberger research scientists who are continually exploring possible new applications of modern science to problems of the oil industry.

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Caps are part of the story

The announcement of the WeldELL line, back in 1931, created a considerable sensation in the piping field. Pipe welding was then just beginning to emerge from the crude, cut-fit-patch stage and the only welding fittings then in use were simply elbows.

But here was a *full line* of welding fittings—not only the long and short radius ells, but also full branch and reducing tees, concentric and eccentric reducers, stub ends, welding neck flanges . . . even *caps!*

You know what happened: The WeldELL line had taken pipe welding out of darkness into light . . . had provided the impetus and set the pattern of modern pipe welding practice.

Yes, the WeldELL line was the first complete line—the first engineered line . . . and the fittings that showed the way are still showing the way. For up-to-the-minute facts about the WeldELL line see your Taylor Forge Distributor.

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Your inquiry will be forwarded to the supplier within 48 hours (or less) from the time we receive it.

To The Oil and Gas Journal: Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of March 15, 1954

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CITY ..... ZONE NO. ..... STATE .....
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To The Oil and Gas Journal: Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of March 15, 1954

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)

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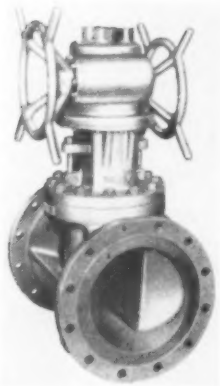
DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

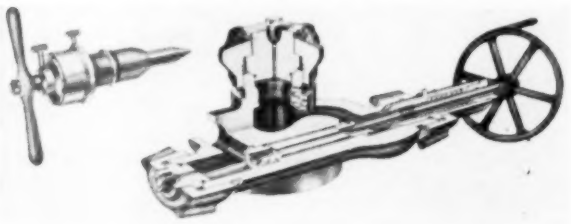
by Dan B. Miller



1 NEW 10 AND 12-IN. PLUG VALVES. Currently being produced in A.S.A. 150 and 300-lb. classes, the new plug valves are available in carbon steel, as well as other materials to meet the demands of almost any service conditions. Chain-wheel attachments for overhead operation are available on both models. Intended for refinery and general service involving high as well as low temperatures, these valves are gland packed. Packings can be changed under pressure while the line is on stream. Extremely versatile, the new plug valves can be operated with or without lubricant. They are equipped with lubrication fittings through which an ordinary medium-grade grease may be applied to the packing and bearing surfaces. Valves are so designed that the lubricant fills the balance chambers first; grease will not enter the line unless an excessive amount is applied. Where lubrication absolutely is prohibited, these valves will operate effectively with the lubricator hole plugged. Two handwheels are provided; one which turns the plug, thus opening and closing the valve; and the other to raise and lower the plug in its seat, adjusting it to the proper fit into the body seat. *Hamer Oil Tool Co.*

IT'S NEW ✓ CHECK IT

2 TYPE "HC" PRODUCTION FLOW CONTROLLER incorporates, in a unitary body, a needle-type valve for complete shutoff, a positive or adjustable choke (or a combination of both), and a christmas-tree cap. The controller connects directly to the top of the master valve and includes all elements necessary to complete a single-wing christmas tree. This single unit takes the place of the christmas-tree tee, the wing valve, the choke, and the christmas-tree cap. Flow comes from the master valve through inlet passage of the body to a valve chamber where it may be shut off by a replaceable seat and valve assembly. Downstream from the valve elements the body is arranged so that either a positive flow bean (shown in position) or an adjustable choke assembly (shown removed) may be used. To change the flow bean, close the valve element, unscrew the bonnet nut, and then unscrew the bean retainer which carries the flow bean in a sleeve. The plain positive choke may be converted into a combination positive and adjustable by substituting choke assembly for the blanking plug. If an adjustable choke alone is desired it may be obtained by removing the positive flow bean and reinstalling the bean retainer which serves as a seat for the adjustable needle. The top of the body is closed with a union-type cap nut and blanking plug to allow easy attachment of bottom-hole-pressure equipment. Top connection is threaded internally for a tubing lift joint when required to manipulate the entire christmas tree during tubing-packer setting operations. The new controller is offered in 2,000, 3,000, 5,000, and 10,000-lb. w.p. models. *Cameron Iron Works.*



IT'S NEW ✓ CHECK IT

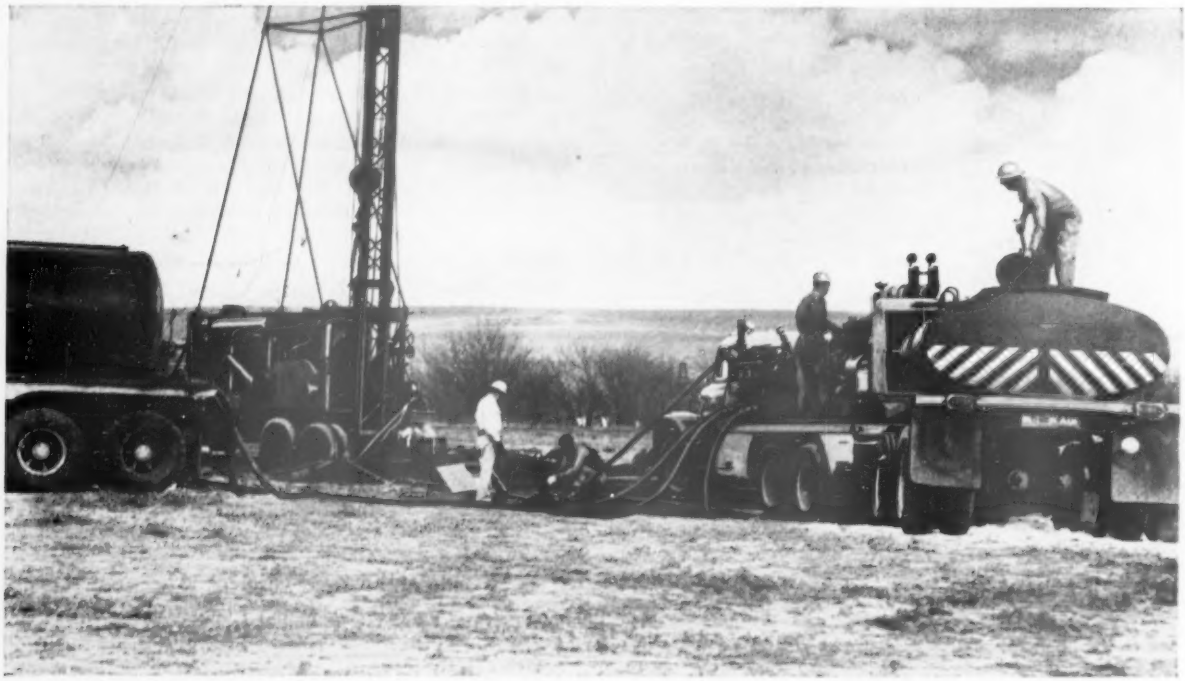
3 NEW "TWO-CUTTER" INTEGRAL JET ROCK BIT is designed especially for slim-hole drilling. The new bit is made in several small sizes and incorporates the same features found in Globe's line of regular two-cutter bits. The principal features are: large, precision-machined ball and roller bearings; large cutters with long, hard-faced teeth, spaced for fast, efficient digging; and high-center construction which assures straight hole in all formations. *Globe Oil Tool Co.*

KEEP INFORMED ✓SAVE TIME ✓TEAR OUT CARD ✓CHECK IT ✓MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

PRODUCTION INCREASED FROM SHOW TO 336 BOPD WITH SANDFRAC*

Economical fracturing treatment, developed by Dowell, produced profitable results in low-solubility formation



A new well completed in a sand formation gave only a show of oil. The operator decided to use Sandfrac®, a Dowell fracturing service, to make a commercial well. Dowell engineers performed the job, using 1000 gallons of oil and 600 pounds of sand. After treatment, the well made 336 BOPD.

Sandfrac has shown consistent success in both new and old wells —in sandstone, conglomerate and dolomitic formations.

In Sandfrac treatments, special refined oils and selected sands are displaced into the producing formation. The oil returns to the well bore after treatment and the sand remains to act as a propping agent in existing and newly created fractures. Thus, the effective drainage area of the well is increased.

A recent development in fracturing methods is the use of sand in batch treatments—a fine-grained sand followed by a coarse-grained one.** This technique helps eliminate the sand screen-outs which can occur in the treatment of some types of dense, tight pay zones.

Thousands of operators have profited from these additional Sandfrac advantages: (1) Sandfrac can be tailor-made to fit specific well conditions; (2) it is a low-cost fracturing service; (3) no shut-in time is required; (4) no jel-breaker solution is necessary; (5) the oils used can be resold by the operator.

Dowell engineers furnish all materials and especially designed, high-pressure pumping equipment. Their experience on thousands of these jobs helps assure you of dependable service.

For more complete details on Sandfrac and other services developed by Dowell, call the Dowell station or office nearest you; or write directly to Tulsa 1, Dept. C-11.

*Sandfrac is a registered service mark of Dowell Incorporated.
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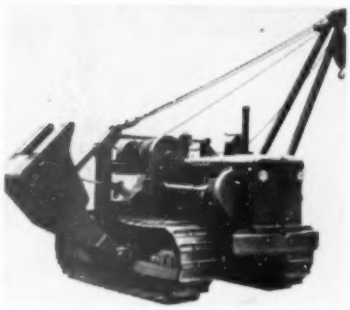
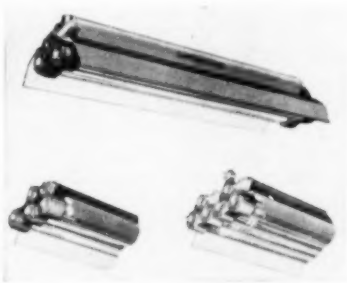
FOR OIL INDUSTRY CHEMICAL SERVICE

4 NEW TSB-9 SIDE BOOM for a crawler tractor has a 38,000-lb. lifting capacity at 4-ft. overhang. It is for the Allis-Chalmers HD-9F tractor, 72 drawbar horsepower. It is expected to fill the requirements of many pipe-line contractors working with small-diameter feeder and distribution lines. It will also serve in the oil fields and at refineries for general maintenance work, as well as on actual pipe-line construction. The front-mounted power takeoff has several advantages. It means the power is taken from a live shaft so that the side boom works independently of the tractor master clutch. Further, the front power takeoff leaves the back of the tractor free for installation of a winch or other rear-mounted equipment. The twin-clutch arrangement on the power takeoff consists of two multiple-plate Twin-Disc clutches, one for raise and one for lower. By pulling one lever, the operator can change from "raise" through neutral" to "power down" on either the load or boom line. No gear shifting is necessary. This results in an added safety feature in that the operator does not have to shift gears to change from raise to power lower. The TSB-9 has an effective counterweight of 6,500 lb. which may be extended and retracted hydraulically. Dropproof counterweight linkage is standard equipment. The toggle-type linkage is so arranged that the counterweight is supported entirely by the linkage when fully extended. The external expanding brakes on the load and boom lines are completely enclosed for full protection from dirt and moisture. *Tractomotive Corp.*



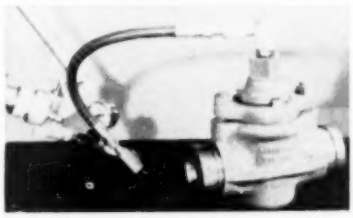
IT'S NEW CHECK IT

5 EFU EXPLOSIONPROOF FLUORESCENT FIXTURES for use in hazardous locations now include two, three, and four-lamp designs for both straight and angle mounting, and offer a choice of three different ballasts. These fixtures permit safe relamping from either end. Fixtures may be installed in a continuous row, end to end, and will conform to National Electric Code standards when used with appropriate fittings. A wide variety of installations to fit every need is assured. Designed for use with 40-watt, 48-in., T-12 and 100-watt, 60-in., T-17 fluorescent lamps, the fixtures are factory sealed, eliminating the need for external seals normally required within 18 in. of arcing devices. Line connections are made to a terminal block in the junction chamber. End housings are cast aluminum. Reflectors are steel, white enamel inside with gray exterior, and may be removed for cleaning. *Appleton Electric Co.*



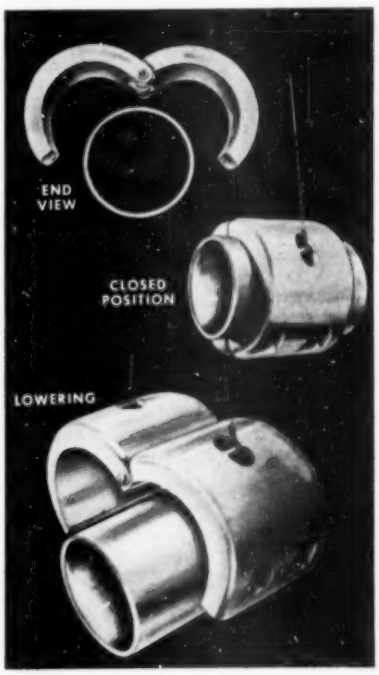
IT'S NEW CHECK IT

6 NEW BUTTON HEAD COUPLER. A new large button head coupler is for use with Rockwell high-pressure lubricant hand guns and bucket pumps. Most important feature of the new coupler is a positive shutoff device to stop all extrusion of lubricant from the coupler immediately after removal from the fitting, thus solving an important field problem. The new device has ¼-in. pipe thread pull-on and top connections. *Rockwell Manufacturing Co.*



IT'S NEW CHECK IT

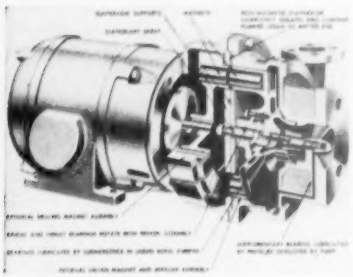
7 DRAG-TYPE HINGED CLAMP WEIGHT. As the name implies, one advantage of this new clamp weight is the streamlined shape which makes it suitable for a drag operation. The drag-type hinged weight is in one piece and, therefore, can be handled easily. On each side are lifting bars built into the clamp to which a sling may be attached for the purpose of lifting or positioning. Due to the fixed pivot hinge, the clamp will remain open when the sling is attached to the lifting bars. When the clamp is placed on pipe, it closes and automatically lines up the holes for the two locking bolts to be applied. The basic material is cast iron. It is equipped with bolts and pins as well as steel lifting bars. Clamps are shipped assembled, thereby eliminating time, trouble, and labor in the field. *Lloyd Metal Foundry Co.*



IT'S NEW CHECK IT

8 MAGNETIC-DRIVE HORIZONTAL PUMP UNIT. The pump has no rotating seals, no packing, and no rotating member between the driver and the driven unit. The complete sealing-off of the liquid end of the pump is accomplished by the employment of a true magnetic drive. Power is transmitted from motor to pump by employing

the simple principle of matching magnetic fields, from adjacent opposite poles, mounted around the periphery of the driving and driven elements. A circular disk, with 12 to 24 permanent magnets is attached to the rotating motor shaft. This drives a similar size permanent disk magnet and impeller unit, which is attached to and rotates around a stationary shaft in the liquid end of the pump. No connection whatsoever exists between the driving magnet and the driven magnet. As a result, a nonmagnetic diaphragm is employed to completely separate the driven or liquid end of the pump from the driving end of the pump. Because of separation, and because no rotating connection is maintained between the two ends, liquid being pumped in the liquid end is confined to that end and cannot escape from it. The magnetic-drive pump is an end-suction, horizontal, centrifugal-type unit. Bearing lubrication is effected by liquid being pumped. At the present time, the magnetic-drive pump can be powered by motors, with ratings of 1, 1½, and 2 hp., operating at 1,760 r.p.m. Driving motor can be of standard, totally enclosed, or explosionproof design, with any required electrical characteristics. *Peerless Pump Division, Food Machinery & Chemical Corp.*

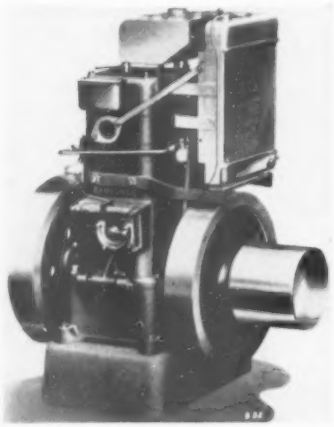


IT'S NEW CHECK IT

9 LEAKPROOF PRECISION OILER has a valve built in the spout. Twisting valve opens or closes it. When valve is closed, oiler is hermetically sealed and leakproof. Pressure on the stainless-steel base delivers one drop of oil at a time. Spout is drilled of solid brass rod, each individually made on screw machines. Tapered tip of spout fits most oil holes. Body of Valvespout is constructed of solid chrome-plated brass. Model illustrated is the Type 350B. Valvespouts are made in six different models, having bodies of brass, celluloid, or hot tin-coated sheet metal; with capacities of ½ to 6 fluid ounces. Seven different types of interchangeable spouts, both straight and bent types, are available in lengths from ½ to 10 in. *Continental Arms Corp.*

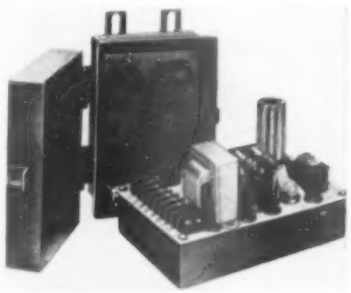
IT'S NEW CHECK IT

10 BAMFORDS DIESELS. Featuring a hinged crankcase and a detachable governor for easy adjustment, the single and twin-cylinder slow-speed diesels are available from 3½ to 16 b. hp. at 600 to 700 r.p.m .The seven models in the line are of the direct-injection type, a feature which provides efficient combustion at all loads and minimum deposit over long periods. Each model is quickly started by hand under all weather conditions, and all models can be equipped with auxiliary starting devices. The diesels are easily coupled and require no speed-reduction unit for most driven equipment. The design and slow speeds insure less wear on parts and lower fuel consumption per brake-horsepower-hour. The valve arrangements, overhead exhaust, and screened inlet valves operated by a single cam, function with the minimum of working parts. Main bearings and rockers in the twin models have pressure lubrication. Replacement of the cylinder unit is never necessary due to the renewable cylinder liner. *International Selling Corp.*



IT'S NEW CHECK IT

11 FLO-GARD was designed to meet the demand for a fail-safe, highly sensitive alarm device for rotameters, manometers, and similar process instruments in order to provide dependable operating stability. The unit offers a wide range of sensitivity for both high and low flow signaling and can operate accurately in conjunction with spherical floats as small as 3/32 in., permitting use on smallest rotameter capacity ranges. It will detect 1 mm. of float-position change. Fail-safe features insure that in the event of power failure, or failure of any electronic component, the load relay will drop out and operate the alarm contacts. Two sensing coils may be connected in series to the same alarm unit and either installed on a single rotameter to provide both high and low flow alarms, or installed on separate rotameters. Signals can also be provided for "return to normal" by special design of the rotameter in many instances. *Brooks Rotameter Co.*



IT'S NEW CHECK IT

12 THRED-GARD, a new high-temperature thread compound that protects against the welding action of threaded connections subjected to prolonged exposure to extreme heat, will eliminate seizing and galling at operating temperatures up to 1,200° F. The compound is nonhardening and acts as a lubricant to allow easy disassembly of threaded connections, even after lengthy service under the most severe conditions. Not only is dismantling time greatly reduced,, but damage to stud, bolt pipe joint, and plug threads is prevented, thus permitting their reuse many times over. *Crane Packing Co.*

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Approximate weight of the complete equipment is 12,500 lbs.
The complete assembly includes the (1) poles, (2) breakdown shaft assembly, (3) attached racking platform (which positions itself when poles are raised), (4) pole adjusting screws, (5) a sheave assembly to be mounted on truck or trailer for raising the poles, (6) and a four or five 24 inch sheave crown block for $\frac{7}{8}$" line.
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13 BUYERS' GUIDE TO PETROLEUM SOLVENTS is a four-page, file-type folder designed to save time in choosing the correct solvent for individual product needs. It contains a comprehensive list of aliphatic naphthas, paraffinic hydrocarbons, aromatic hydrocarbons, and solvents, and their typical properties. *American Mineral Spirits Co.*

14 NEW DEAN HILL CATALOG NO. 500. This flexible-covered, 16-page publication furnishes complete data on the improved D-H horizontal and vertical turbines, which were recently redesigned to provide up to 100 per cent more horsepower on some models. All the new design changes are incorporated in the new catalog, including hand valves, carbon ring packing glands, governor valves, bearings, and trip valves. *Dean Hill Pump Co.*

15 NEW AC NULL BALANCE RECORDER CONTROLLER is a new eight-page fact-filled Bulletin F-451 describing AC Null Balance Recorder Controllers. Designed initially for resistance bulb thermometry, but applicable to many other process variables, the bulletin describes many design features. The unitized design which leads to low maintenance costs is clearly illustrated. Full specifications are included. *Robertshaw-Fulton Controls Co.*

16 FOAM FIRE PROTECTION. In simple question - and - answer style the booklet tells what foam is, how it works, where it is used, and what foam devices are used. Designed for quick reading and easy reference, the booklet packs into 16 pages basic information relating to mechanical and chemical foam and their devices. *National Foam Systems, Inc.*

17 LAGGING ADHESIVE is a four-page, three-color bulletin describing Adhez-A-Kote lagging adhesives and coatings for shrinking, sizing, bonding, and protecting insulation lagging fabrics. Designated as Technical Bulletin 5307, the publication outlines features of the product, pictures typical installations, and provides an actual sample of treated lagging fabric. *General Paint Corp.*

18 FAST FUELING FOR L.P.G. ENGINES is a four-page bulletin covering a fast fueling unit for tractors, trucks, and engines using L.P. gas. The material covers a new Model GG 196 Viking pump with capacity of 10 g.p.m. at 1,750 r.p.m. and driven by a ½-hp. explosionproof motor. The whole unit weighs approximately 145 lb. and is mounted on a steel base. Installation method, performance curve, and specifications are included. The unit is also designed for handling anhydrous ammonia. *Southern Engine & Pump Co.*

19 TUBING SWABS with full description and explanation of uses, tips for better service, and accessories, including overload relief valve, ball-bearing swivel-sinker bar connection, and rope sockets are included in an eight-page, two-color catalog. Methods for drill pipe and Hydril tubing swabbing are explained. Bell swabs feature the reversible cup, flexible assembly, and overload relief valve. *Bell Rubber Co.*

20 BAXCO CHEMONITED FOREST PRODUCTS is the title of a new 32-page brochure which tells a comprehensive story of pressure-treated wood and its value and uses in many fields of industry. The booklet is printed in 2 colors with 125 illustrations. *J. H. Baxter & Co.*

21 FIRE CAN DESTROY YOUR BUSINESS. This new bulletin points out that 43 per cent of firms whose records are lost in fires never reopen and an additional 28 per cent quit business within 3 years. Outlining the advantages of automatic fire-protection systems, the bulletin stresses the fact that 50 to 90 per cent reduction in fire insurance costs due to the installation of a Blaw-Knox system will pay the cost of the complete installation in 5 to 10 years. Various types of systems available such as water, fog, foam, and carbon dioxide are discussed and illustrated. *Blaw-Knox Co.*

22 JACKETED VALVES NOS. 93 AND 93U. New data units 220 and 221 describe operational features of jacketed valves for heated-cooled gages or wherever small jacketed angle valves are required. It includes full specifications and cutaway views showing internal construction. *Jerguson Gage & Valve Co.*

23 ANALYSIS - TESTING - RESEARCH - DEVELOPMENT. Bulletin No. 5 describes the fuels laboratory together with facilities for test-

ing, research, development, and analysis of petroleum products. Single sample prices are quoted for a number of tests. *Raymond C. Crippen Research & Development Laboratories.*

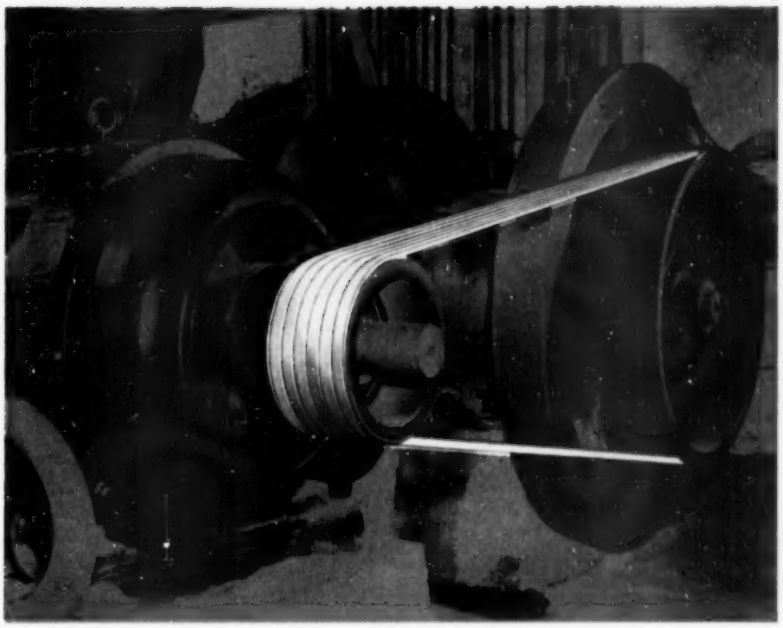
24 ROTARY-DRILLING OUTFITS, a two-color, six-page fold-out, lists and illustrates a line of draw works, rotary tables, bushings, pumps, crown and traveling blocks, swivels, tongs, elevators, spiders, tool joints, kelly, drill collars, reamers, blowout preventers, control gates, fishing tools, and drill bits. *Alfred Wirth & Co.*

25 SHAWNEE AND SCOUT DITCHERS. A two-color, four-page folder shows actual on-the-job illustrations and engineering data on backhoe-type ditchers designed for mounting on the back of a tractor. Mounting and demounting time is about 20 minutes. The Shawnee ditcher has a reach of 10 ft. and will ditch to 7½ ft. The Scout has a 14-ft. reach and will ditch to 10½ ft. *Shawnee Manufacturing Co.*

26 B AND W SCRATCHERS AND CENTRALIZERS FOR A GOOD CEMENT JOB. Perforated for binding in a loose-leaf folder, this eight-page, two-color brochure offers selection charts, instructions for mounting on casing, and illustrations of action of the equipment while running-in and pulling. Full data are included on all products in the line. *B and W, Inc.*

27 TRAVELOADER. Bulletin 1360 covers applications, space requirements, and dimensions and specifications on a side-loading material-handling unit that delivers like a road truck, carries a straddle truck, and stacks like a fork truck. Illustrations show the unit handling steel beams, pipe, and construction materials. *The Baker-Raulang Co.*

28 DUPLEX TUBES TECHNICAL BULLETIN NO. 1954. This bulletin explains the wide use of Duplex tubes for heat exchangers and condensers in industries and process plants handling corrosive liquids, gases, refrigerants, and circulating waters. Double corrosion simultaneously attacking the inside and outside of tubes can be retarded with Duplex tubes, whose inner and outer walls are made of two different metals. The bulletin lists the handling of various products such as are found in chemical and petrochemical processes; the cooling of lubricating oils, and other applications together with corresponding components of metals in Duplex tubing. *Bridgeport Brass Co.*



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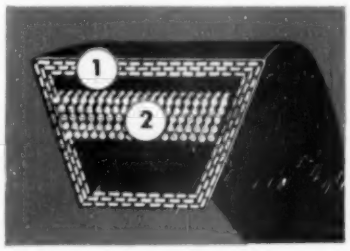

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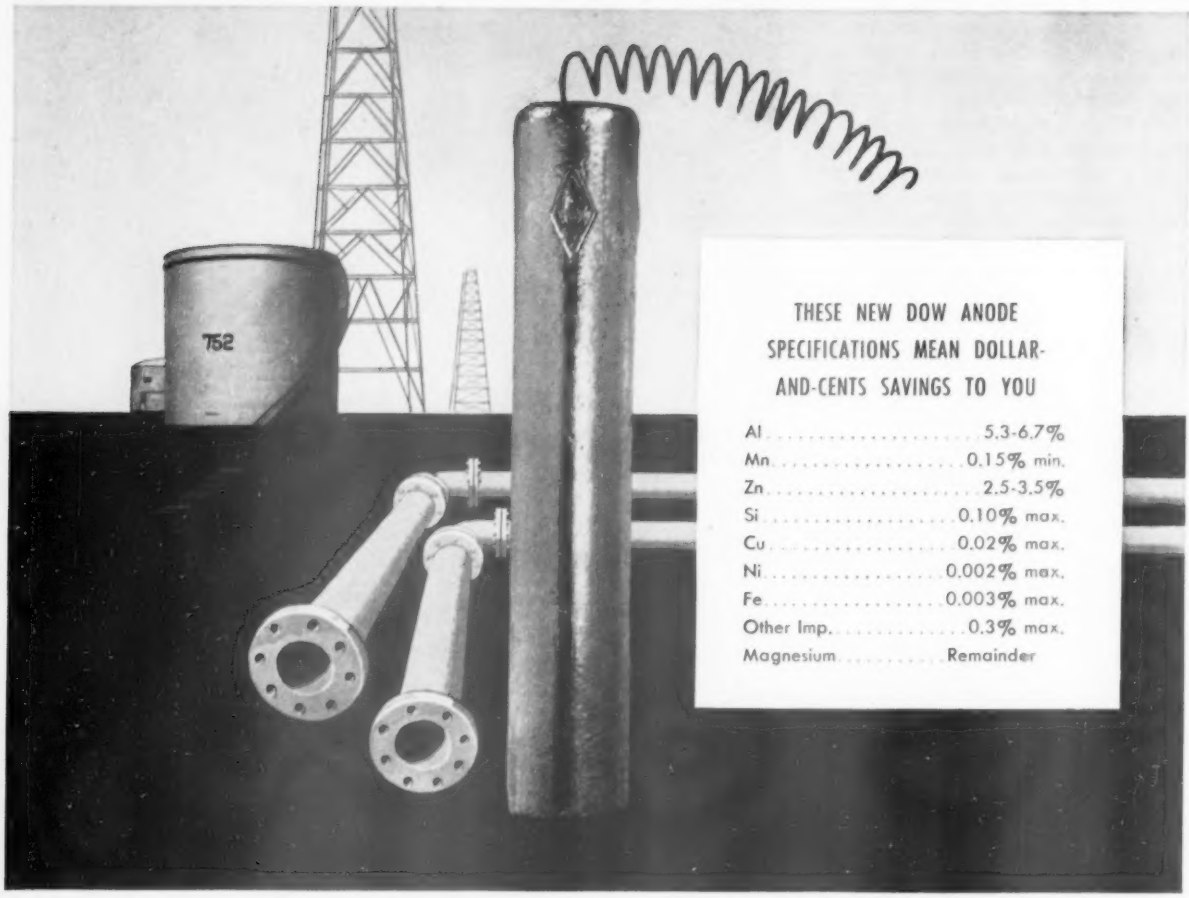
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PIPE LINES

Gas Line Opposed

Hearing recessed until April 12 on gas proposal

DENVER. — The Colorado Public Utilities Commission has recessed its hearing on the natural-gas pipe-line application of Colorado-Western Pipeline Co. until April 12, at which time company witnesses will be cross-examined by attorneys for Colorado Interstate Gas Co. and Pacific Northwest Pipeline Corp., both of whom have opposed the Colorado-Western application.

The recess was granted after James L. White, attorney for Colorado Interstate, first moved for a dismissal of the application on grounds that Colorado-Western had failed to show ability to finance the proposed line, had not shown the availability of the needed gas supply for the markets, had failed to show any ability to deliver the necessary reserves, and had failed to show ability to sell the gas.

Pacific Northwest Pipeline Corp., which currently has an application before the Federal Power Commission for a line from the San Juan basin into the northwestern section of the United States, joined Colorado Interstate Gas Co. in opposing Colorado-Western's application.

Proposed line . . . Colorado-Western is engaged in hearings on a proposed 328-mile, $21,600,000 line from La Plata County in southwestern Colorado, over the Continental Divide, and along the eastern slope to serve Pueblo, Colorado Springs, Denver, and intermediate points. *(The Oil and Gas Journal, March 1, page 119).*

The company had previously applied for a 454-mile, $33,000,00 system which would originate in the gas fields in La Plata, Montezuma, Dolores, San Miguel, and Montrose counties and go through Durango, Cortez, Montroze, Gunnison and Salida with lateral lines serving Delta, Saguache, Monte Vista, Alamosa, Canon City, Florence, Portland, Buena Vista, Leadville, and Climax, *(The Oil and Gas Journal, January 18, page 55).*

Hearings on Colorado-Western's originally proposed system have been scheduled for September 7. Hearings on the most recent proposal of the company began March 8.

Pacific Northwest is opposing the Colorado-Western proposal because "the markets of Colorado Interstate Gas Co. would be affected if a certificate was granted." The biggest single sale contract contemplated by Pacific Northwest would be about 100,000 M.c.f. daily to be sold to Colorado Interstate at a junction near Rock Springs, Wyo., primarily to serve Colorado markets.

Wyoming system . . . Colorado Interstate already has completed hearings before the Federal Power Commission on its proposal to build a 365-mile line from Rock Springs, Wyo., to Denver.

Pacific Northwest contends that its proposal and that of Colorado Interstate will better serve the public interest of Colorado than those of Colorado-Western by offering a larger market to Colorado producers in presently shut-in gas fields, by serving a larger area of Colorado at less cost than Colorado-Western, and by offering larger volumes of natural gas to provide for the long-range future needs of the state.

Pacific Northwest claims producers of natural gas on the western slope need its line to provide a market outlet, and that through it and the Colorado Interstate Rock Springs-Denver line, Colorado would be assured supplies not only of gas from the San Juan basin but also from western slope fields and Utah and Wyoming fields.

Colorado-Western has negotiated contracts with El Paso Natural Gas Co. and other producers in fields in La Plata and adjoining counties. The contract with El Paso is for 50,000 M.c.f. daily.

Line Work Begun

P. G. & E. Super Inch final expansion starts

SAN FRANCISCO.—Engineers Limited Pipeline Co. crews have begun work on 107 miles of 34-in. loop lines along Pacific Gas & Electric Co.'s 502-mile Super Inch system.

The final stage of a 200-mile addition and the second major expansion of the Super Inch's capacity, the current construction will increase capacity of the system to 700,000 M.c.f. daily *(The Oil and Gas Journal, October 26, page 165).* It will bring the total installation of 34-in. line to 787 miles on this project.

The new construction is divided into two sections, an 80-mile section between Newberry and Danby, Calif.,

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FLEET-LINE

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Nozzle sizes from 1/4" to 24"

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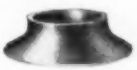

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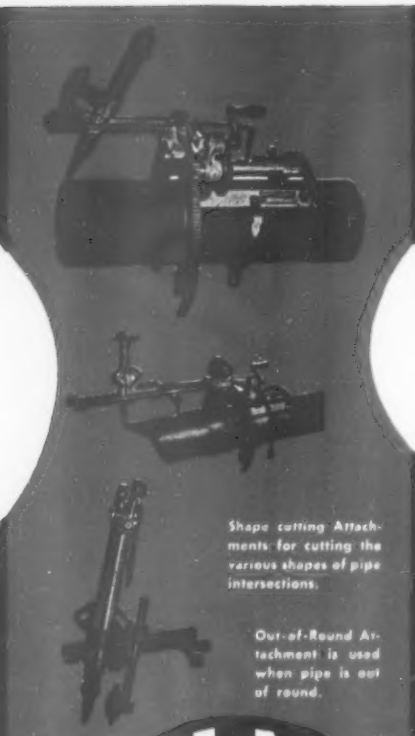

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and a 27-mile section starting north of Hollister, Calif., and terminating south of the city.

Another project recently completed raised the capacity of the system from 400,000 to 550,000 M.c.f. daily, and completion of the first stage of the current construction increased capacity to more than 600,000 M.c.f.

Compressor stations . . . The company has three compressor stations along the system—a 20,000-hp. station at Topock, Ariz., at which 2,500 hp. more is being added, a 24,000-hp. station at Hinkley, Calif., and a 19,360-hp. booster station in Kern County, California.

The 34-in. system, extending from a point west of the Colorado River near Topock, Ariz., through San Bernardino and Kern counties, up the west side of the San Joaquin Valley to Milpitas, Calif., near here, was opened in 1950.

To meet the demands of the Super Inch's expansion, El Paso Natural Gas Co. is building a 771-mile, 30-in. transmission system from West Texas and New Mexico producing areas to Topock. It will have a capacity of 300,000 M.c.f. daily of which P.G.&E. will get half and Southern California Gas Co. and Southern Counties Gas Co. will get the remainder.

P.G.&E. plans to continue use of output from California fields at the rate of an average of about 324,000 M.c.f. daily.

Plains Sale Asked

Franklin County Coal Co. seeks purchase of system

CHEYENNE, Wyo.—A plan for purchase of Plains Pipe Line Co. of Newcastle, Wyo., is awaiting approval of the Wyoming Public Service Commission.

Franklin County Coal Co. of Wilmington, Del., has proposed purchase of the 250-mile Plains system for a reported $2,025,000. The purchase would be made from John B. Murchison and Clint Murchison, Jr., of Dallas, who purchased Plains on January 29 for an undisclosed sum. *(The Oil and Gas Journal, January 11, page 146).*

Dwight W. Dahlman, commission secretary, said that 82,430 shares of Plains stock are outstanding, of which 20,730 shares are owned or controlled by Keith Thomson, Cheyenne attorney. Owners of other Plains stock have agreed to sell to the Murchison interests, who have agreed with Thomson and the group he represents to sell to Franklin County Coal Co.

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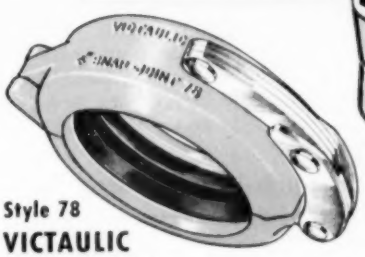

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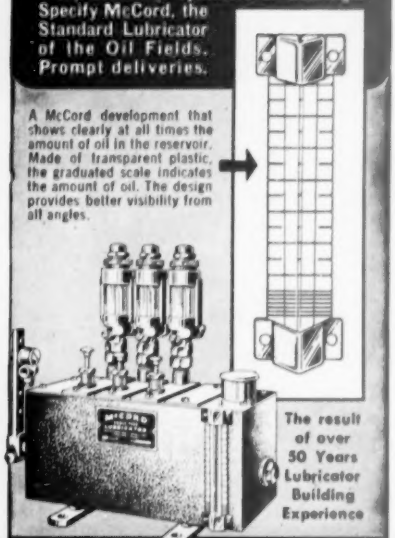
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In the transaction, Plains would be liquidated.

Franklin County Coal, whose principal operations are now in Franklin County, Illinois, also has advanced two other plans involving the issue of $800,000 in 5 per cent cumulative preferred stock and $1,500,000 in 5 per cent first mortgage bonds.

The Plains system consists of 106 miles of trunk lines in eastern Wyoming providing Weston County producers with crude transportation from Mush Creek to Newcastle and Lance Creek, 93 miles of gathering lines, and extensions currently under construction.

Products-Line Conference Slated for Philadelphia

PHILADELPHIA. — The fifth annual Products Pipe Line Conference sponsored by the Division of Transportation of the American Petroleum Institute will be held here May 10-12 in the Warwick Hotel.

Technical papers will cover warehousing, oil-soluble inhibitors, putting a new line in operation, storage tank equipment and maintenance, progress report on metering practices and calibration, and recent developments in microwave and supervisory control.

A field trip will visit installations of Buckeye Pipe Line Co., Ltd., at Macungie, Pa.; Sun Pipe Line Co., at Knights Gap, Pa.; and Keystone Pipe Line Co., at Exton, Pa. Panel and round-table discussions will end the 3-day meeting.

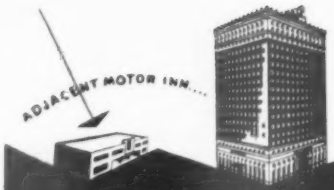
Price Is Awarded Contract For Coating Badger Line

BARTLESVILLE, Okla.—Badger Pipe Line Co., jointly owned by Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co., and The Texas Co., has awarded a contract to H. C. Price Co. for Somastic coating of its entire new products system.

The 215-mile, $15,000,000 products system between East Chicago, Ind., and Madison, Wis., will have a capacity of 65,000 bbl. per day, with distribution points at Madison, Wis., and Rockford, Des Plaines, and Southwest Chicago, Ill. *(The Oil and Gas Journal, September 21, page 372).*

A railhead coating plant already has been moved by Price to Elmhurst, Ill., to process the pipe.

The contract calls for ½-in. Somastic coating of 197 miles of 12¾-in. and 17½ miles of 10¾-in. pipe. The coating for the 12-in. pipe will weigh 19.51 lb. per lineal foot and 16.56 lb. for the 10-in. pipe. Price expects to complete the job by midsummer.



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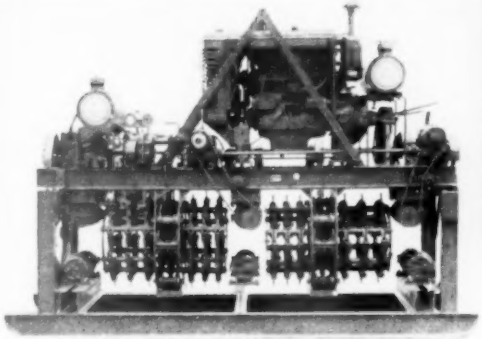
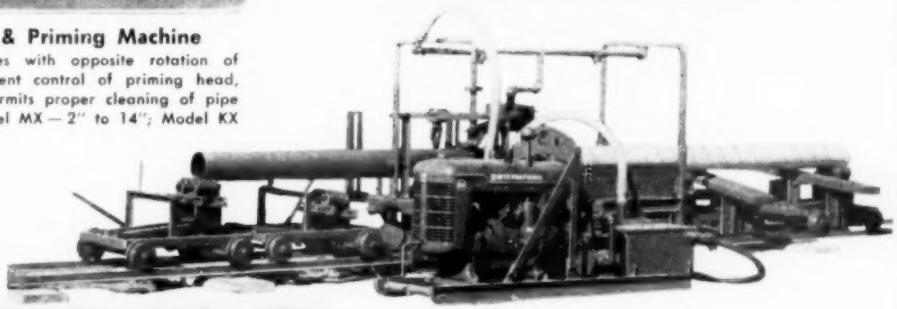


Stationary Cleaning & Priming Machine

Has dual head assemblies with opposite rotation of cleaning heads. Independent control of priming head, and pipe input speeds permits proper cleaning of pipe in various conditions. Model MX — 2" to 14"; Model KX — 16" to 26".

Stationary Coating & Wrapping Machine



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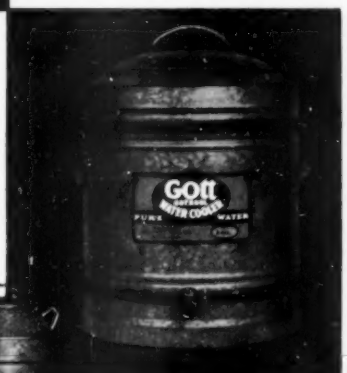

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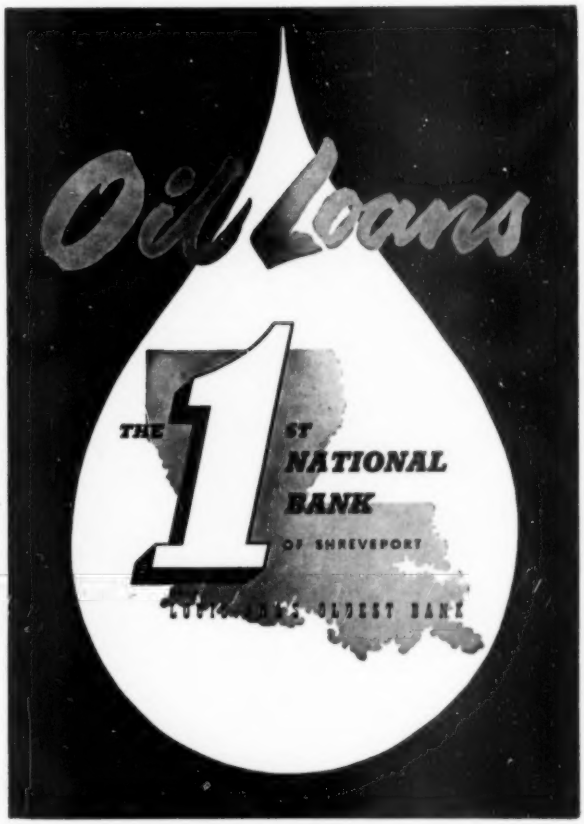

OKMULGEE, OKLAHOMA This Thermofor Catalytic Cracker recently went on stream at the Phillips Petroleum refinery, here. Although similar to the TCC unit built simultaneously by Fluor for Phillips at Woods Cross, Utah, this unit incorporates several innovations: it was one of the first of the airlift type which can use any type of pelleted catalyst, it is the first to employ a vacuum unit that is directly integrated with the cat cracker, and was the first to be silenced (silencers were installed on the blowers). Fluor designed, engineered and constructed this plant including the feed prep unit, fractionation and gas plant, and offsite facilities – *on time* – proving again that Fluor's reputation for building superior plants and process facilities has been well earned.

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REFINING

Socony-Vacuum Refineries Reduce Residuals Output

NEW YORK.—Socony-Vacuum Oil Co., Inc., and its affiliates have cut production of residuals at their refineries from 26 per cent of crude runs to 14 per cent since 1946 at a saving, before taxes, of $30,000,000 a year.

The 12 per cent difference was converted largely into gasoline and middle distillates, Clark S. Teitsworth, Socony vice president, told a meeting here of the Oil Analysts Luncheon Group of New York. The national average residual fuel oil yield last year was 17.6 per cent of crude runs.

Teitsworth said installations of the company-developed Thermofor catalytic cracking process soon will reach 312,000 bbl. per day, or 53 per cent of the company's crude runs. A total of 47,000 bbl. per day of catalytic reforming capacity is now under construction at company refineries, and within 3 years Socony plans to have 93,000 bbl. in operation, he said.

In describing Socony's progress toward bringing refining and production capacity more in line with its sales volume, Teitsworth said that of a total capital investment of $1,530,516,000 during the period 1946 through 1953, the company and its affiliates spent more than $265,000,000 for refinery expansion and modernization. Crude supply of the group, including gross production and long-term purchases, has increased from 55 to 88 per cent of refinery runs.

ASPPA Publishes Two New Oil Specification Booklets

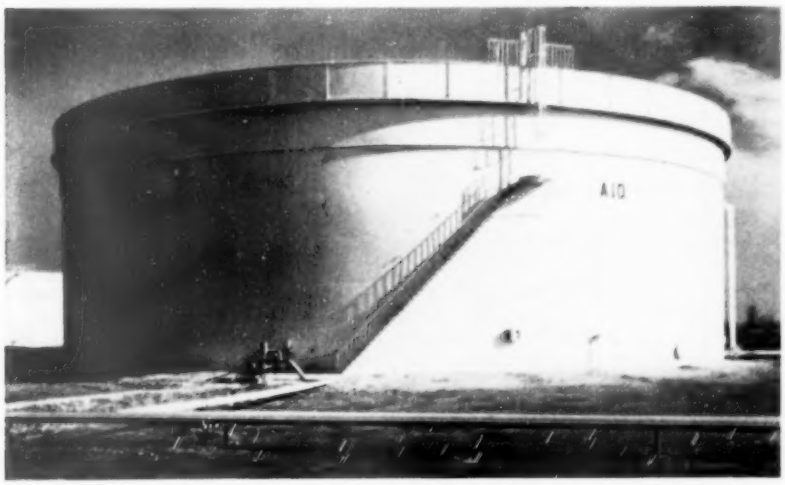
WASHINGTON.—The Armed Services Petroleum Purchasing Agency has issued two documents which officials say should be of considerable value to the oil industry.

One, entitled "Reference List of Specifications, for Petroleum and Related Products," contains a listing of all current specifications, and requirements for packaging and marking. The other, "Specification Information for Prospective Bidders," outlines the procedure for obtaining copies of specifications.

Both publications may be obtained upon request to the ASPPA's Office of Technical Liaison and Inspection, Washington 25, D. C.

Licensing for Unifining Agreed by U.O.P., Union

DES PLAINES, Ill.—Union Oil Co. of California, developer of the Unifining process, and Universal Oil Products Co. have reached an agreement for the



New Gasoline Storage Tank Largest of Its Kind

The 110,000-bbl. expansion-roof tank built by Garver Tank & Manufacturing Co., Inc., for Shell Oil Co. as a part of a new pipe-line terminal at Argo, Ill., just west of Chicago, is the largest gasoline storage tank of its kind in the world. The tank, 140 ft. in diameter and 40 ft. high, is fitted with a patented roof which raises and lowers to accommodate changing pressures caused by the expansion and contraction of gasoline vapors during storage, preventing the loss of these vapors.

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No threads to leak or loosen. No danger of tampering or removing check valves.
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Type H and type P Fittings are guaranteed not to leak under 15,000 lb. pressure.
CADMIUM PLATED PROTECTIVE FINISH

A DELTA Fitting for ANY Lubricated Plug Valve

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licensing of the process by either company.

Unifining is a desulfurization process employing a cobalt molybdenum catalyst in the presence of hydrogen and moderate pressures and temperatures. The hydrogen converts organically combined sulfur in feed stock to hydrogen sulfide. Removal of nitrogen and olefin saturation is also claimed by Union Oil.

Solution to Steel Rupture Problem Seen as Possible

LINDEN, N. J.—Scientists studying the causes of certain types of steel rupture in ships and oil tanks have reported the possibity that experiments which they and others are conducting would soon make it possible to establish steel specifications which will prevent such failures.

The scientists met here last week at the research laboratories of Standard Oil Development Co. to discuss a solution to their problem and observe tests developed by S.O.D., demonstrating fracture of thick steel plates when the steel is brittle. Some failures of this type in oil tanks and tankers have occurred and work is progressing on causes and preventive measures.

M. S. Northrup and F. J. Feely of Esso Engineering Department, who have been studying this type of steel failure about a year, addressed the group. *(The Oil and Gas Journal, February 1, page 73).* They reported the possibility of establishment soon of steel specifications to prevent failures.

Attending the meeting were representatives of the U. S. Navy, U. S. Coast Guard, and National Research Council.

Osceola Refining Co. Buys Producers Refining Plant

REED CITY, Mich.—Osceola Refining Co. here has purchased the 4,000-bbl. skimming and asphalt plant of Producers Refining Co. at West Branch, Mich., which has been idle since last November.

Ray Andress, president of Osceola, said the Producers plant will be studied and possibly modernized and reopened during the summer.

Socal Refitting Tanker To Carry Petrochemicals

SAN FRANCISCO. — Standard Oil Co. of California's tanker, R. G. Follis, is being refitted for shipment of petrochemicals marketed through Oronite Chemical Co., a Socal subsidiary.

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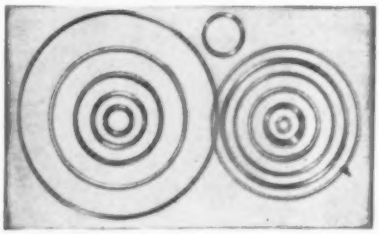

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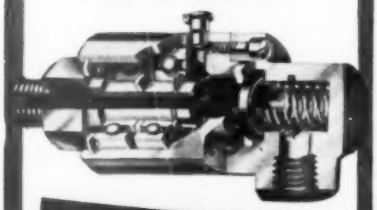

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NATURAL GAS

Gas Output Up

1953 gas operations in Texas show gain

AUSTIN.—Gas operations in Texas last year increased in all categories except cycling, the Texas Railroad Commission reported last year.

In its 1953 summary, the commission set total production at 5,314,711,031 M.c.f., compared with 5,089,376,781 M.c.f. in 1952. Of the total, 4,534,061,835 M.c.f. was available for market, an increase of 5.4 per cent over that available in 1952.

Movement of gas out of the state increased 10.5 per cent to a new high of 2,216,877,822 M.c.f. Twenty-eight pipe-line companies exported gas, the report said.

Gas well output . . . Production from gas wells during 1953 amounted to 3,835,635,847 M.c.f., compared with 3,779,106,990 M.c.f. in 1952. The number of gas wells in Texas increased from 9,562 in January to 10,257 in December, compared with an increase from 8,409 wells in January to 9,202 wells in December 1952.

Formation gas produced from oil wells in Texas in 1953 amounted to 1,479,135,184 M.c.f., compared with 1,310,269,791 M.c.f. in 1952. Wells producing formation gas increased from 96,367 in January to 102,026 in December, compared with an increase from 77,479 wells in January to 95,838 wells in December 1952.

Total intake of 3,418,642,738 M.c.f. of gas in processing plant operations during 1953 resulted in plant production of 108,985,143 bbl. of liquids, compared with an intake of 3,111,876,311 M.c.f. of gas resulting in plant production of 97,847,607 bbl. of liquids in 1952. There were 344 processing plants in operation in January and 385 plants in operation in December, compared with 315 plants in January and 337 plants in December 1952.

Cycling decreases . . . Cycling plant operations during 1953 had a total intake of 923,454,246 M.c.f. of natural gas resulting in plant production of 28,363,139 bbl. of liquids, compared with an intake of 966,487,263 M.c.f. resulting in plant production of 30,047,943 bbl. in 1952. Cycling plants decreased in number from 33 in January to 32 in December, compared with an increase from 31 in January to 33 in December 1952.

Pressure maintenance and repressuring plant operations had a total intake of 56,506,852 M.c.f. of gas in 1953, compared with 53,791,312 M.c.f. in 1952. The number of plants decreased from 141 in January to 136 in December 1953, compared with 143 plants in operation at both the beginning and end of 1952.

Carbon-black plant operations in Texas in 1953 used 197,030,386 M.c.f. of gas, producing 540,585,809 lb. of carbon black at a ratio of 2.74 lb. of carbon black per M.c.f. of natural gas. Carbon-black plants numbered 28 in January and 25 in December.

Contract for Compressor Plant Construction Let

DENVER, Colo.—Contract for construction of a new natural-gas compressor plant near Sterling, Colo., in Mount Hope field, to serve both that field and Walker field, has been let to Blaw-Knox Co.

Paul F. Barnhart, J. Ray McDermott & Co., Inc., Kansas-Nebraska Natural Gas Co., Inc., The Texas Co., Bay Petroleum Corp., and Shell Oil Co. are jointly building the plant which will be capable of compressing 4,500 M.c.f. of gas daily from field pressure of 5 psi. to 800 psi.

Three 440-hp. engine compressors are at Sterling for installation and field gathering lines already have been installed.

Transco Applies for New Loop Lines, Compressors

WASHINGTON. — Transcontinental Gas Pipe Line Corp. has applied to the Federal Power Commission for a $53,058,013 construction program which would include about 421 miles of looping and 15,600 hp. of new compressor capacity.

The new facilities would enable Transcontinental to increase natural-gas deliveries to six customers in the New York City-New Jersey area by 93,490,000 cu. ft. daily. The facilities are part of an expansion program announced last fall. *(The Oil and Gas Journal, November 30, page 49).*

Transcontinental said it is seeking authorization for substantially the same service as that proposed by Tennessee Gas Transmission Co. in another application before the FPC. Five applications involving Tennessee Gas, including a $33,677,000 project to expand facilities to provide additional service to five customers and to serve four new customers, are scheduled for hearings this week.

Transcontinental's proposed expansion project would include 190 miles of 30-in. line and 231 miles of 36-in. line paralleling sections of the company's existing system in Louisiana, Mississippi, Alabama, Georgia, North and South Carolina, Virginia, and Maryland. The compressor facilities would be located in Texas and Louisiana.

The new facilities would increase Transcontinental's system sales capacity to 653,500,000 cu. ft. of gas daily.

Iroquois Gas Plans New Gas-Transmission Line

WASHINGTON. — Application for construction of a 24½-mile 20-in. natural-gas transmission line has been filed by Iroquois Gas Corp. with the Federal Power Commission.

Iroquois said the proposed line from its Porterville compressor station in Elma, N. Y., to Tonawanda, N. Y., would cost an estimated $1,540,000. It would give the company a direct supply of natural gas at a mixing station in Tonawanda for use by Iroquois and Republic Light, Heat & Power Co., Inc.

Plastic Piping Panel Set For April A.G.A. Meeting

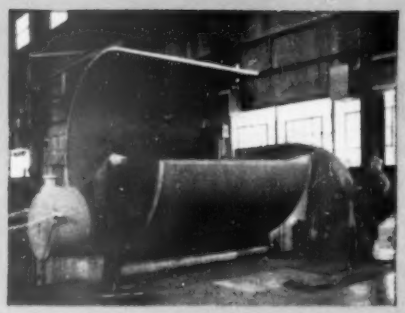
MONTREAL, Que.—A panel meeting devoted to plastic piping, headed by Guy Corfield of Southern California Gas Co., will be included in a 4-day conference of the American Gas Association to be held here April 20-23.

An intensive program covering nearly every phase of the distribution, motor vehicles, and corrosion branches of the gas utility and pipe-line industry will be presented during the conference.

FPC Amends Evidence Rules On Documents for Hearings

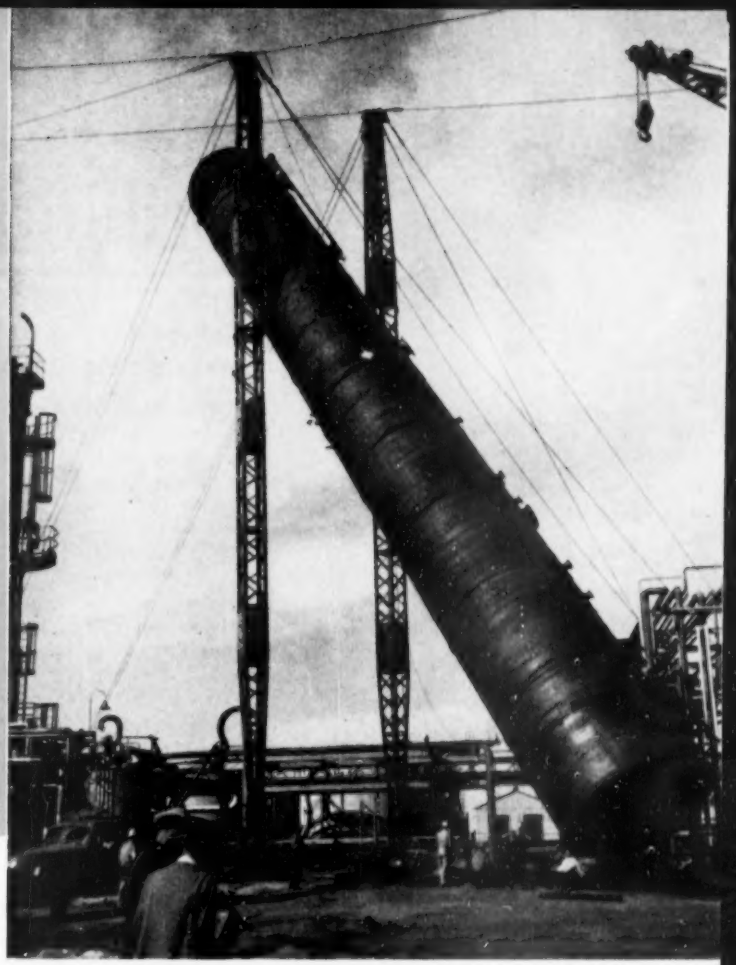
WASHINGTON.—The Federal Power Commission has amended its rules permitting public documents as evidence in hearings even though the documents are not actually produced and are not in the FPC's official files.

Previously, all documentary evidence in hearings had to be produced and identified, with the exception of reports and other documents in the FPC files.



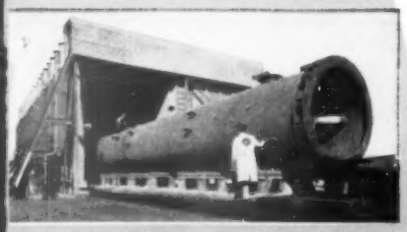
One of the first steps in pressure vessel fabrication consists of rolling the plate into curved sections with heavy plate bending rolls like this.

Custom Fabrication For The Process Industries...



A BS&B-Fabricated Phenol Treating Tower goes into place in a large Gulf Coast refinery. Though not the largest made by BS&B, this vessel is fabricated of ⅞" plate, is 13' in diameter by 135' long and weighs 380,000 lbs., including trays.

Partial view of a welding bay in our Oklahoma City plant, showing pressure vessels in various stages of completion.



After fabrication is completed, the pressure vessel must be stress-relieved in this specially built gas-fired annealing oven. It employs a 10-point temperature recorder with thermocouples attached directly to the vessel.

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Among the Drilling Contractors

Midwestern Rig to Drill Texas Panhandle Wildcat

Midwestern Drillers, Tulsa, has moved one of its larger rigs, which have been operating in the Liberal area of southwestern Kansas, to Hansford County, in the Texas Panhandle, where it is under contract to Phillips Petroleum Co. for a 7,500-ft. wildcat test. The test is designated as 1 Higgs, with location in Section 302, Block 2, GH&H Survey, in the central part of the county.

This company is keeping another of its larger rigs working for Columbian Fuel Corp. in development of Novinger field, in Meade County, Kansas. It has just completed one 5,400-ft. well for the operator, and is rigging up for another, 8 Vail. Its other large rig is on a deeper-formation test being drilled for the same company in Grant County, Kansas, in the Hugoton gas field.

The company's newly acquired smaller rig a U-34, capable of drilling to 5,000-ft. depths, is being set up for its first hole, a test to be drilled for J. M. Huber Corp. on the west side of Hugoton field, east of Richmond, in Morton County, Kansas.

Coleman Drilling Co. is drilling on Southern Minerals Corp.'s second well in the recently opened Northwest Mowata area, in Acadia Parish, Louisiana Gulf Coast. The new operation, 2 Frey, is 1,500 ft. northeast of the operator's discovery well, completed as a 60-bbl. pumper in sand at 4,203½-08½ ft.

R-B Well Service Co. has contracted with Magnolia Petroleum Co. for a 9,500-ft. wildcat test, 1-G Long Bell, to be drilled 3 miles north of Fulton, in Beauregard Parish, South Louisiana. Location, in 8-6s-8w, is 3 miles east of Cow Pen Creek field, nearest production.

Allen & Morris, San Antonio, will drill another test for Sunray Oil Corp. in North Hostetter field, McMullen County, Southwest Texas, where the latter operator recently opened gas-condensate production. Location is for 2 Stella Penn, southwest of the discovery well, in AB&M Survey 65.

Glasscock Drilling Co., Shreveport, is scheduled to drill a deep test for J. Paul Ratliff, of New Orleans, at a wildcat location 2 miles southwest of La Place, 30 miles northwest of New Orleans, in St. John the Baptist Parish, Louisiana. The test is listed at 1 Godchaux, in 21-11s-7e.

Whitehurst Drilling Co., Shreveport, is starting a Travis Peak exploratory test in the Richie area, 3 miles southwest of Calion, northern Union County, southern Arkansas, on a contract with Pan-Am Southern Corp., of El Dorado, Ark. The test is carried as 1 Daniel estate, with location in 29-16s-14w.

Santa Fe Drilling Co., Santa Fe Springs, Calif., has moved a rig to the Merced area, in Merced County, California, where it will drill another wildcat test, 1 Valley Agricultural, for Richfield Oil Corp. This is Richfield's fifth exploratory effort in the area within the past year.

McCalman Drilling Co., Homer, La., has taken on a well-deepening job for Midstates Oil Corp. in Bistineau field, Bienville Parish, North Louisiana. The well, 1 Carter in 12-16n-10w, will be deepened from 6,997 ft., where it was abandoned in January 1950, to approximately 8,100 ft. for a look at the Bodcaw (Cotton Valley) sand.

Masters Drilling Co., Bakersfield, Calif., is under contract to Intex Oil Co. for another well in the North Mount Poso area, in northern Kern County, California. The new operation, 3 Gill, in 24-26-27, is southeast of the company's recently completed discovery well.

K. L. Kellogg & Sons, Compton, Calif., will do the drilling on Humble Oil & Refining Co. wildcat test, 1 Preszler, in the Comanche Point area, 8 miles south of Arvin, in Kern County, California. Hole is expected to be carried to between 7,000 and 8,000 ft. Location is 2 miles northwest of small, shallow production in Comanche Point field.

John L. Morgan has a contract with H. L. Rowley, Inc., of Shreveport, for a Wilcox test, 1-A Lambdin, to be drilled in Vernon field, in Adams County, southwestern Mississippi. Lo-

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cation is in 45-8n-2w. Objective is around 6,200 ft.

Rowan Drilling Co., Houston, has contracted with Continental Oil Co. for a deep offshore test to be drilled on State Lease 977, in Block 52, West Delta area, off the coast of Plaquemines Parish, Louisiana.

Gene Reid Drilling, Inc., Bakersfield, Calif., is scheduled to drill a projected 5,500-ft. test for Arthur Cameron at a wildcat location southeast of Russell Ranch field, in Cuyama Valley, northeastern Santa Barbara County, California.

Green & Heiser Drilling Co. has a rig working for Golden Bear Oil Co. on a wildcat location in the Stockdale area, Kern County, California. Location is west of production in Fruitvale field. Hole is projected to approximately 4,700 ft. The test is 87-33 KCL, in 33-29-27.

Ray Boyd has taken a contract for an 8,500-ft. wildcat test to be drilled in Kleberg County, South Texas. The test, 1 Rothman, will be drilled for E. A. Branham and J. A. McDonald. Location is 10 miles southeast of Seeligson field.

Theriot & Larson, Lafayette, La., will drill Fifteen Oil Co.'s projected 13,000-ft. wildcat test, 1 Nunez, located south of Grand Chenier field, in Cameron Parish, Louisiana Gulf Coast. Location is in 13-15s-5w.

Como Drilling Co. is contractor for Ginther, Warren & Ginther, of Houston, on a new operation scheduled to be drilled in Ovett field, Jones County, southeastern Mississippi. The well, 3 Majors, in the C NW NE 29-6n-7w, is projected to 9,000 ft.

ACTIVE ROTARY RIGS*

Area—	Week ended 3-8-54	Change week ended 3-1-54	Change week ended 3-9-53
Gulf Coast	505	— 3	— 94
N. & W. Tex.-N. M.	791	+23	— 43
Ark.-N. La.-E. Tex.	196	+11	+ 86
Oklahoma	391	+ 8	+ 75
Kansas-S. Nebraska	169	+24	+ 10
Illinois-Eastern	121	+ 1	+ 21
Rocky Mountains	240	+ 5	+ 63
Pacific Coast	155	+11	0
Total U. S.	2,568	+80	+118
Western Canada	155	+ 2	— 6
Total	2,723	+82	+112

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown on pages 213 and 214.

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EXPLORATION

Texas Cambrian . . . An Unknown Quantity

by Frank J. Gardner

ONCE upon a time, there was a professor of geology whose hair was the russet color of Hickory sand. He was a dynamic man, with a knack for vivid and dramatic teaching that his students rewarded with awe and respect, and they called him "Hickory-Dickory-Doc." He had a colorful way of making you remember what he said, and one of the things he often said had to do with Hickory red—"Gee, what a reservoir **that** would make, if only a man could find a stake!"

That poetic man was 20 years ahead of his time—for today, much of West Texas is engaged in the search for Cambrian-Hickory oil reservoirs. And it all started when a man named Kilroy found his stake.

It was not really new, after all, for in Pecos County in 1942, Gulf Oil Corp. 3 Millar had opened Texas' first Cambrian production; but it dwindled, and little attention was paid to the strike. Eleven years went by before a second Cambrian discovery at Coke County's North Bronte (now Rawlings 5,500-ft.) field came into the news early in 1953. Some interest was shown in this development, and real attention was attracted when American Trading & Development Corp. 1 Little logged 198 ft. of Hickory pay at White Flat field in Nolan County and completed for a daily potential of 857 bbl. in June 1953.

Then in August, Kilroy found his stake. Kilroy Oil Co. of Texas 1 C. J. Roberts, discovery well of EA Cambrian field, gaged a potential of 1,293 bbl. per day on a ½-in. choke and established the Cambrian as the oil man's "target for today." The usual stories of frenzied leasing and fabulous prices in a lease-tight trend sparked a new West Texas boom; this was no freak occurrence, and geologists in the eastern Permian basin dusted off their college texts to rediscover the Wilberns, the Cap Mountain, and the Hickory.

What will it amount to—this Cambrian trend? Our present knowledge of the formation in the West Texas subsurface is too sketchy to draw conclusions, but we do know its surface characteristics, and we have a vague idea of its distribution. We know that in Kansas, and in Wyoming, the Cambrian has proved to be a major source of oil, and that new estimates reveal its Texas potentialities can dwarf all previous discoveries from it.

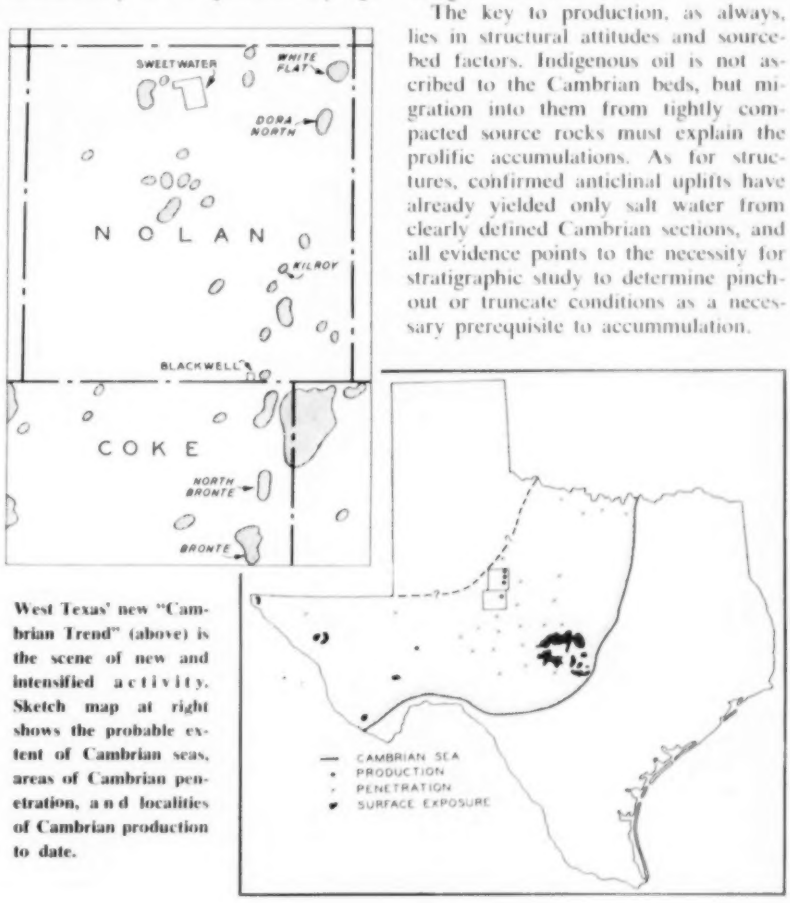
We know that significant figures recently revealed indicate abnormally high porosity and permeability, reserve estimates of 300 to 500 bbl. per acre-foot, and ultimate recoveries in the nature of 1 to 1¼ million barrels per well. Saturated pay sections 100 to 200 ft. thick have been reported from depths averaging 6,000 ft. in the four discoveries of recent date.

At the moment, there is some controversy over the exact age of the pay sands in the Nolan and Coke County fields; some operators hold that they are true Hickory sands, while others contend they are of post-Hickory age in certain fields. In view of the fact that surface lithologic breaks have not been clearly defined, the controversy is not unexpected.

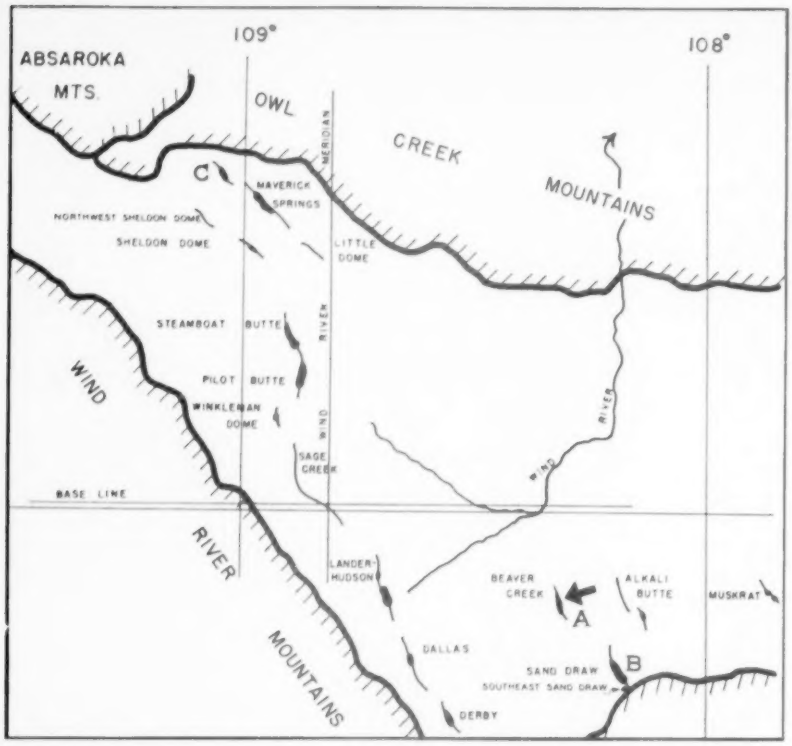
On March 19-20, the San Angelo Geological Society will conduct a field trip over the Llano exposures; an unprecedented advance registration indicates the heat of current interest in the Cambrian question in West Texas, and no doubt some of the problems of correlation will be nearer a solution at the end of the trip.

There are five areas of surface exposure of the Upper Cambrian in Texas: the Llano uplift, Solitario and Marathon uplifts, the Van Horn region, and the Franklin Mountains. Lower and Middle Cambrian have not been recognized in the state.

The key to production, as always, lies in structural attitudes and source-bed factors. Indigenous oil is not ascribed to the Cambrian beds, but migration into them from tightly compacted source rocks must explain the prolific accumulations. As for structures, confirmed anticlinal uplifts have already yielded only salt water from clearly defined Cambrian sections, and all evidence points to the necessity for stratigraphic study to determine pinch-out or truncate conditions as a necessary prerequisite to accummulation.



West Texas' new "Cambrian Trend" (above) is the scene of new and intensified activity. Sketch map at right shows the probable extent of Cambrian seas, areas of Cambrian penetration, and localities of Cambrian production to date.



TECTONIC MAP of Wind River basin showing principal bordering uplifts, local anticlinal features, and oil-field development. Madison dolomite oil was first found in the basin at Circle Ridge (C), recently at Beaver Creek (A) and deep drilling is now under way at Big Sand Draw field (B). (Fig. 1).

Madison Dolomite Offers New Wind River Basin Objective

by Joseph A. Kornfeld

RECENT discovery of commercial oil production from the Madison group of Mississippian age in Beaver Creek field, Fremont County, Wyoming, has intensified interest in this deep objective in the Wind River basin. (See Fig. 1.)

One-half mile southeast of Stanolind Oil & Gas Co.'s recent Madison limestone new pay discovery at Beaver Creek, Stanolind has staked location for a second deep test for development of reservoirs lying below the Pennsylvanian Tensleep formation. Delta Drilling Co. is drilling at 1,818 ft. for a 12,400-ft. test to the Madison and to the basement rocks at Stanolind's 32-M, NE SE SE 10-33n-96w.

Madison discovery well was Stanolind's 30-M, C S½ NW NE 10-33n-96w, which was completed on January 5, 1954. Original total depth is 11,447 ft. and the 7-in. casing was cemented at 11,406 ft. with 1,070 sacks. Initial completion gage was 341 bbl. of 42°-gravity oil produced in 24 hours through an 8/64-in. tubing choke. Initial produced gas-oil ratio was 132 cu. ft. per bbl. Flowing tubing pressure was 1,350 psig. and flowing casing pressure was 1,240 psig.

Big Sand Draw unit . . . Sinclair Oil & Gas Co. has started a deep test to the Madison at Big Sand Draw field which lies southeast of Beaver Creek. Sinclair is deepening from 7,010 ft. its 15 Unit, NW NW SE 10-32n-95w, from present total depth of 7,010 ft. in the Permian Embar (Phosphoria) limestone; Madison group is expected to be reached at about 7,750 ft. current drilling depth is 7,221 ft.

Deepest test drilled to date at Big Sand Draw field in the past was Sinclair's 9 Big Sand Draw Unit, SW SW NW 14-32n-95w, which reached a depth of 8,169 ft. in Madison limestone topped at 8,065 ft. (—1,921 ft.).

Principal oil reservoir at Big Sand Draw is the Tensleep sandstone which is also the deepest developed reservoir in that field. Tensleep reservoir, found at about 7,285 ft., has produced more than 15 million barrels of oil. Currently 11 flowing oil wells and 2 pumping oil wells are producing from this reservoir.

Structural Geology

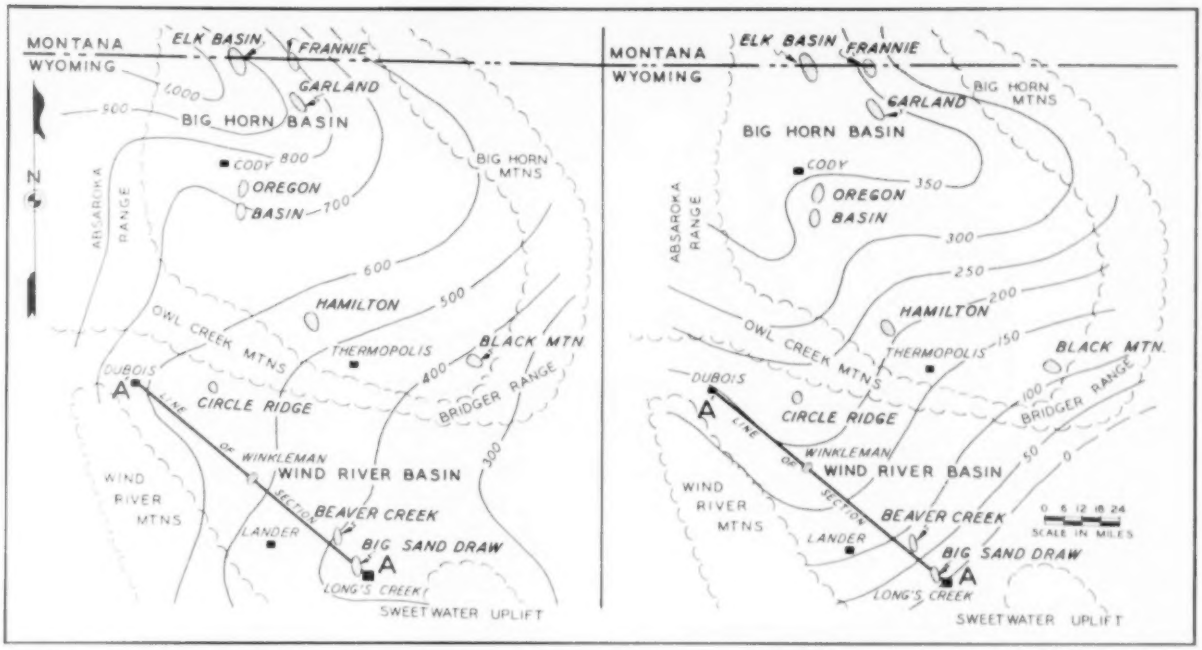
Wind River basin in western Wyoming is bounded on the north by the Owl Creek-Bridger uplift and by the southern portion of the Absaroka range; on the east by a line of folding and faulting between the Big Horn and Laramie Mountains which separates the Wind River from the Powder River basins; on the south by the Sweetwater uplift, and on the southwest and west by the Wind River uplift.

Basin axis of the Wind River basin lies near the northern limits of this major asymmetrical structural syncline. Central portion of the basin is filled with Tertiary Eocene sediments which do not reflect generally the attitudes of the disturbed pre-Tertiary rocks.

Beaver Creek (A) is a gently folded anticline in beds of the Eocene Wind River formation and about 100 ft. of closure is exhibited in the surface rocks. However, with depth, the major axis of this anticline changes to northwest-southeast to roughly parallel the southern margin of the Wind River basin. More than 1,200 ft. of structural closure has been mapped with total closure not yet determined.

Big Sand Draw (B) typifies structures now being tested for Madison oil possibilities. Structurally, Big Sand Draw is located along the crest of a long, narrow asymmetrical anticline which trends N. 30° W., and generally parallels larger mountain-type uplifts to the east and west. Axis of Big Sand Draw structure plunges northwestward under Tertiary cover into the Wind River basin en echelon to the Beaver Creek axis.

Circle Ridge (C) is a small, asymmetric anticline situated in proximity to the south flank of the Owl Creek range in the western constriction of the Wind River basin according to Bebee.[1] In common with most of the anticlines of the western portion of the Wind River basin, Circle Ridge is asymmetric to the southwest and like many of these structures, is cut by an east-dipping thrust fault. Productive area of the overthrust Madison is small; initial completions range from between 100 to 200 bbl. of 23.4°-gravity oil on each of two producing oil wells.



GEOLOGIC CROSS-SECTION A-A' of the Madison rocks in the Wind River basin is shown above taken from Long's Creek to Dubois. (From Denson & Morrissey). (Fig. 2).

ISOPACHOUS CONTOUR MAP of the Lodgepole in the Wind River and Big Horn basins. Contour interval: 100 ft. (From Denson & Morrissey). (Fig. 3).

Stratigraphy

Madison limestone received its name from the Madison range in the central part of the Three Forks quadrangle of Montana where the formation produces conspicuous outcrops according to Wilmarth.[2] Age of Madison group is considered to be lower Mississippian, probably Kinderhookian and Osagean from limited faunal evidence described by Weller[3] and Branson.[4]

Denson and Morrissey[5] have described the Madison group in the Wind River basin and a northwest-southeast cross-section A-A' is shown in Fig. 4. Beds of unknown age, probably Meramecian or Chestorian, and designated on the cross-section as "Upper Madison," occur locally between the basal Darwin sandstone of the Pennsylvanian Amsden sandstone and the massive Mission Canyon formation.

TABLE 1—TYPE FORMATIONAL SEQUENCE—MADISON LIME DISCOVERY

Beaver Creek Dome, Fremont County, Wyoming

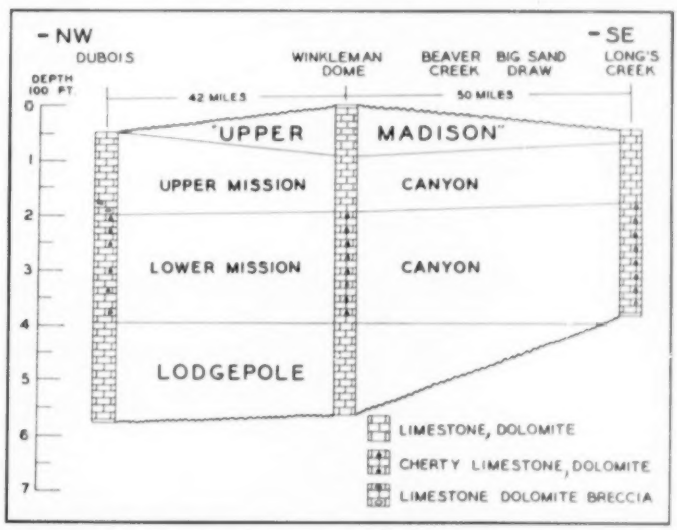
Stanolind's 30-M, C S½ NW NE 10-33n-96w, (Electric log determinations)

Geologic formations	Top logged at (ft.)
U. Cretaceous:	
First Frontier sandstone	6,717
Second Frontier sandstone	6,820
Third Frontier sandstone	6,913
Fourth Frontier sandstone	7,113
Fifth Frontier sandstone	7,235
Muddy sandstone	7,903
L. Cretaceous:	
Lakota	8,243
Jurassic:	
Morrison	8,298
Nugget sandstone	8,830
Triassic:	
Chugwater	9,167
Dinwoody	10,252
Permian:	
Embar (Phosphoria)	10,259
Pennsylvanian:	
Tensleep	10,625
Amsden	11,088
Darwin	11,122
Mississippian:	
Madison group	11,204
Total depth	11,447

Mission Canyon formation . . . Upper Mission Canyon member ranges from 90 to 155 ft. (see Fig. 3.) Lithology is brown to gray, fossiliferous, sublithographic to pseudo-oolitic limestones with finely crystalline dolomite bearing scattered nodules of chert. A persistent breccia zone marks the base of this member.

Lower member of the Mission Canyon formations ranges from 140 to 160 ft. in thickness. Composition is gray to tan, finely crystalline cherty dolomites and locally siliceous limestones.

Lodgepole formation . . . Thickness of



ISOPACHOUS CONTOUR MAP of the Lodgepole formation in the Wind River and Big Horn basins. Contour interval: 50 ft. (From Denson & Morrissey). (Fig. 4).

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the Lodgepole formation varies from 350 ft. at the Wyoming-Montana state boundary to 100 ft. at Lander, and thins to the southeastward; at Long's Creek, 30 miles east of Lander, the Lodgepole is not identified. (See Fig. 4.) Lithology is gray to brown, locally fossiliferous, and oolitic limestones and finely crystalline dolomites in its upper part which grade into finely crystalline limestones and dolomites in the lower part of the formation. No chert is recognized in the Lodgepole. Sandstone and shale are found locally in the basal 10 to 20 ft.

In early Mississippian time, deposition expanded southeastward from the northern part of the Big Horn basin during lower Lodgepole time. By the beginning of Mission Canyon time, most of the Wind River basin, in addition to the Big Horn basin, was receiving marine sediments. Pre-Amsden erosion accounts for local variations in total thickness of the Madison group.

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5. Denson, M. E., Jr., and Norman S. Morrissey, "The Madison Group (Mississippian) of the Big Horn and Wind River Basins, Wyoming," Guidebook, Seventh Annual Field Conference, Southern Big Horn Basin, Wyoming, (1952) pp. 37-43.

APPALACHIAN AREA

OHIO

Wray Drilling Co. 1 Halbert Taylor, Lot 3, Licking Township, Muskingum County, topped the second Clinton at 3,336 ft. and finished in sand at 3,350 ft. with 500,000 cu. ft. natural. The well is in the center of the old incompletely drilled Nashport field.

In Hanover field in Hanover Township, Licking County, Pure Oil Co. 5 S. M. Romini, Lot 1, made 117 bbl. in 24 hours after a fracture treatment. Clinton sand was logged at 2,888-2,944 ft.

Another gasser was added to the pool in Butler Township, Knox County, Ohio Fuel Co. 1 Purdy, Section 12, gaged 1,600,000 cu. ft. natural from Clinton at 3,071-3,123 ft.

WEST VIRGINIA

In Licking district, Tucker County, West Virginia, Snee & Eberly are drilling at 4,165 ft., in the Tully lime in their 1 W. H. Blair wildcat. This formation was reached at 4,104 ft. McComas district, Cabell County, West Virginia Gas Corp. 5-576 Gill-Porter, is drilling at 4,410 ft. Two shows of gas have been reported, one in the Corniferous lime and one in the Oriskany sand. Williams district, Wood County, South Penn Oil Co., has shut down 1 J. Lee Taylor, at 4,970 ft., Oriskany sand 4,723-4,765 ft., show of oil 4,729-4,731 ft.

KANSAS

Pumping Equipment Being Installed at Harper Strike

Pump is being set up at Beardmore Drilling Co. 1 Berg, SW SW SE 29-32s-7w, Harper County wildcat 12 miles southeast of Grabs pool and 5 miles southwest of Harper in the central part of the county.

The discovery swabbed 9 bbl. of oil per hour after 10 hours from perforations in the Viola lime at 4,758-64 ft.

New Mississippian Gas Pool

Mississippian Gas Pool Opening in Ford County

City Products Corp. with W. J. Coppinger as contractor and operator, has a new gas discovery in southwestern Kansas' Ford County.

The 1 Vice, SW SW NE 14-28s-21w, between Pleasant Valley and Helmers gas pools, gaged an estimated 10,000 M.c.f. per day from Mississippian perforations at 5,056-74 ft.

OKLAHOMA

Second Well Apparent At New Tillman Pool

Union Oil Co. of California has the second well success apparent at its new oil pool southeast of Frederick in southern Tillman County.

The 3 Emenhiser, NE SE NE 23-3s-17w, recovered oil on first drill-stem test. The second drill-stem test is being run in the Cisco sand. Recovery on the first test was 1,030 ft. of free oil, 110 ft. of heavily oil and gas-cut mud, 5 ft. of oil and gas-cut salt water and 5 ft. of salt water. Gravity of the oil is estimated at 42°.

Holdenville Boom Area Has Added Promise

The rapid development of Grief Creek pool in the Holdenville area of Hughes County received promise of another pay zone at Leta M. Chapman 7 Bruner, SE SW NE 15-7n-9e.

The well flowed 13 bbl. of 38°-gravity oil

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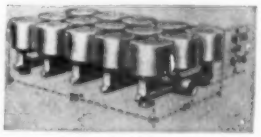

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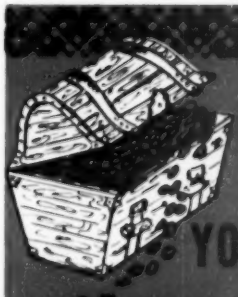

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per hour on 15/64-in. choke from the Hartshorne sand which lies beneath at least part of the Booch production in the field. The well is ringed by Booch producers. The operator may plug back and complete in the Booch, the field's regular pay, after further testing. The Hartshorne sand in the area is quite consistent, but is found to be thin and tight. The 7 Bruner is offset to the northwest, west, southwest and south by Booch producers.

CANADA

Mississippian Discovery For Cynthia-Pembina Area

Stanolind Oil & Gas has discovered natural gas and crude oil in the Mississippian formation at its East Cynthia "A" 1 Crown wildcat in the Cynthia-Pembina region of central Alberta, 70 miles west-southwest of Edmonton.

The new Cynthia find, LSD 16, 30-51-9w5, is 14 miles northwest of the Socony-Seaboard 30-15 North Pembina well (nearest Pembina Cardium oil producer), 12½ miles southeast of the Select Oils 1 Chip Lake wet gas discovery well, and 20 miles south of the Shell 2 Peers wildcat that discovered oil in the Cardium and gave a showing of oil in the Viking sand. It is 10¾ miles north of the Stanolind-Hudson's Bay "C" 1 Pembina Crown well and 17½ miles north of that group's Pembina-Crown "D" 1 well. Those latter two wells are currently being prepared for swabbing tests, in an effort to evaluate the indicated Cardium oil zone.

East Cynthia "A" 1 Crown ran a 30-minute drill-stem test from 6,587 to 6,612 ft., in the top of the Mississippian. Natural gas flowed to the surface in 3 minutes, at maximum rate 2,000,000 cu. ft. daily, and flowed oil in 15 minutes. The fluid from the pipe, all oil, was pumped out, and there were 360 ft. of oil below the pump out sub, no water. Gravity of the oil is estimated at 35° and about 10 ft. of porosity had been opened at bottom of the above drill-stem test. Crew is currently preparing to test, after coring another 10 ft. of zone.

Another Mississippian gas and oil discovery has been indicated in the general Pembina region of central west Alberta, 65 miles southwest of Edmonton. This new strike was made in the Buck Creek sector of that prolific oil area, on the eastern side. This venture now has prospects of developing into a triple zone oil success, having previously encountered oil in the Cardium and Viking. Owners of the new strike are Socony-Vacuum Exploration Co., Seaboard Oil Co. of Delaware and the Honolulu Oil Corp., Merrill Petroleums, Ltd., and Cancoll Oil & Gas, Ltd.

The Mississippian production came at Socony-Seaboard 35-8 Buck Creek, LSD 35, 8-47-7w5, which is 3½ miles northeast of the Seaboard-Great Plains-Baysel 6-15 Buck Creek venture that found oil in the Cardium and oil encouragement in the Viking, 7 miles northwest of the Canadian Delhi-Great Plains et al 11-33 Viking oil discovery and Mississippian wet gas success.

Although not as yet officially reported by operator of this project, it is understood that a 40-minute drill-stem test was run from 6,766 to 6,786 ft. Natural gas flowed to the surface in 1 minute, at maximum rate 5,000,000 cu. ft. daily, and oil flowed in 32 minutes. When pipe was pulled it was found to contain 270 ft. of oil and 120 ft. of sulfurous water.

A Cardium sand oil extension has been indicated in the Minnehik region by a team of 12 Canadian and American oil companies and a group of individuals. The well, Canadian Delhi-Great Plains et al 10-31 Minnehik, LSD 10, 31-46-6w5, is 1¾ miles west of the 11-33 Minnehik Viking oil discovery, 4½ miles southeast of the Seaboard-Great Plains-Baysel 6-15 Buck Creek venture that struck oil in the Cardium, and 60 miles southwest of Edmonton.

The 10-31 Minnehik well was taken down to total depth 7,002 ft. The Mississippian gave up only a small noncommercial showing of gas, and hole was plugged back for tests in the Cardium, as the Viking sand formation was also nonproductive.

String of 7-in. casing was set at 5,210 ft., and crew perforated in the Cardium interval 5,130-42 ft. An acid wash was applied to the perforations, and during swabbing test the well produced oil at rate of 8½ bbl. hourly. Hole was then perforated from 5,104-20 ft., and crew was running tubing at latest report.

Kathyrn area . . . Some light gravity crude oil and oil-cut mud have been discovered in the basal Blairmore formation at Socony-Vacuum Exploration's wildcat in the Kathyrn area of southern Alberta, 10 miles northeast of Calgary. About 1 month ago this same exploratory driller had given up an encouraging showing of natural gas in the Belly River sand formation.

The crude oil came at Socony-C.P.R. 3-2 Kathyrn, LSD 2, 3-26-28w4, which is situated 7 miles east-southeast of Balzac and 27

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miles southwest of the Delhi-Banff 1 Acme wildcat that discovered oil in the D3 Devonian zone last year.

A 1-hour drill-stem test in the basal Blairmore interval 6,900-22 ft., flowed natural gas to the surface in 32 minutes and gave up a recovery consisting of 70 ft. of light brown oil and 130 ft. of heavily oil-cut mud. Coring and testing is being continued.

The Belly River gas showing came when the Kathyrn well drill-stem tested from 3,088 to 3,152 ft. for 1 hour. Gas flowed to the surface in 2 minutes, at rate 230,000 cu. ft. daily, and recovery was 300 ft. of gas-cut mud. The Belly River contact was at approximately 3,085 ft., or 407 ft. subsea (K.B. elevation 2,678 ft.).

EASTERN CANADA

Ontario . . . In the Wardsville area, bordering on Middlesex and Elgin counties, Anchor 1 Ashley, completed as a gas producer from the Guelph-Niagara formation, is proving a good producer with a sustained pressure exceeding most wells in the field. The well was a joint test by Anchor Petroleum and Ashley Minerals. Anchor 2 Ashler is drilling 1,000 ft. north of No. 1. This is one of two locations indicated as favorable by geological examination, the other being a similar distance east of No. 1, where Anchor 3 Ashley will be started following completion of the second well.

In Sombra Township, Lambton County, two wells drilled by Stanwell Oil & Gas on unitized acreage have fininshed at around 2,200 ft. without commercial production. Stanwell is studying geological and drilling data before locating adidtional tests.

Gaspe . . . In the Gaspe Peninsula, Quebec province, the 1 Tar Point, with gas production from 7,069 ft., has been cleaned to almost total depth and water completely bailed, preparatory to starting pressure tests.

MICHIGAN

Preliminary check of Richfield horizon cores were disappointing at the C. W. Jetter 1 Gingrich, NE NE NE 36-18n-11w, Pinora Township, Lake County, the first test in Reed City field area to reach the Richfield since oil was discovered in this horizon at Pure Oil Co. 1 Gingrich, SE SE SW 30-18n-10w, Lincoln Township, Osceola County.

The Jetter 1 Gingrich was drilled to 4,675 ft., Richfield total depth, where a 6 to 8-hour drill-stem test was scheduled to be run with packer set at 4,659 ft. According to geological reports, sand was logged in this well at about 4,674-4,675 ft., or just over 1 ft. of sand body. The section was reported to be very hard, tight and with no porosity. The Richfield sand pay in Pure's discovery producer in this horizon was 12 ft. thick.

Apparent porosity and an odor of oil was logged in Richfield dolomite-line material at 4,665-66 and at 4,668-68½ ft. Another 4-ft. section showed fairly good on drill time, from 4,689-90 ft., but core showed it to be very tight. There was a faint oil odor at this point.

The results of the drill-stem test will probably be the answer to further drilling or testing at this well. The Jetter test is located about ½ mile west and south of the Pure producer.

The thin section of Richfield sand at this important test well was almost as disappointing to some as its apparent lack of a probable commercial oil pay. It had been hoped that this Richfield sand body would show some thickneess along this flank of the pool and offer evidence of some uniformity of possible sand pay horizon. It now begins to appear that the Richfield producing pay at the Pure well may be rather spotty in the Reed City pool. Additional drilling, either new holes or deepening of older producers, will be needed to get a good picture of what the Richfield offers over the pool as a whole.

CALIFORNIA

West Belgian Anticline Discovery Indicated

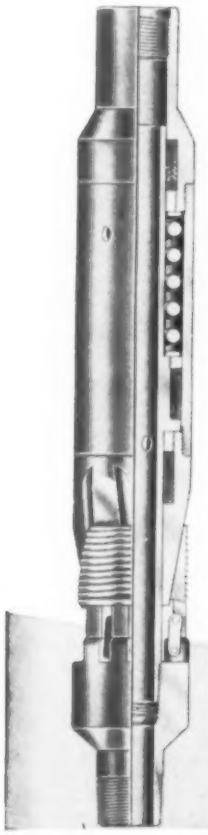
Pacific Western Oil Corp.'s wildcat 1 mile west of Belgian Anticline production has indicated it will give westside San Joaquin Valley a new oil discovery. The test, 1 R-K in 23-30s-21e, was in process of completion at last reports after having set 7-in. casing at 5,852 ft., total depth.

On a formation test at 5,688-5,852 ft. the wildcat reportedly flowed 28.5°-gravity crude at a 400 bbl. daily rate. Production was from the third Point of Rocks sand (Eocene). Shell Oil Co. has staked location for an eastern offset on its fee-owned properties.

New Edison Pool

Dumm Bros. Petroleum Corp. 1 Doc Crandall was completed as a new pool discovery in the West Edison area of Kern County. The wildcat topped the Nozu sand, middle Miocene, at 5,040 ft. and flowed at the daily rate of 489 bbl. through perforations at 5,001-5,209 ft. Location of the new discovery is in NE NE 17-30s-29e.

In the Jeppi area about ½ mile northwest,



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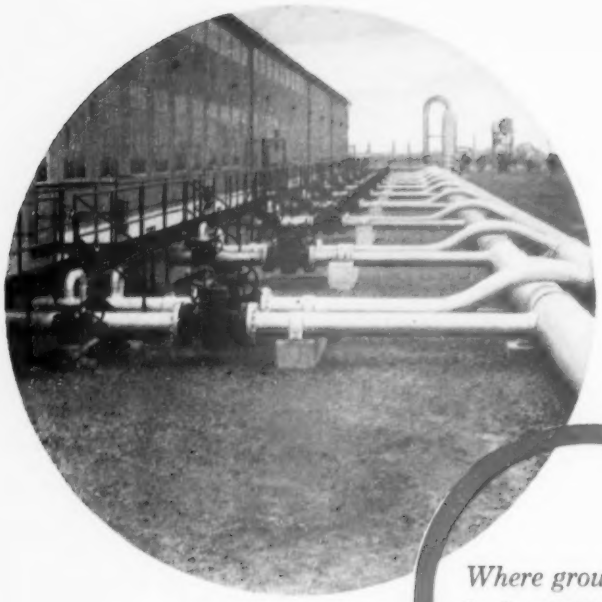

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Standard Oil Co. of California was attempting to open a new deeper pay at 55-8 Jeppi-Camp. On a formation test at 5,725-57 ft., probably in sands of lower Miocene age, the wildcat flowed some gas.

New Wheeler Ridge Tests

Rilchfield Oil Corp. has staked location for an Eocene test about 3½ miles southeast of its Wheeler Ridge deep discovery and about 6½ miles west of the field plans to start a second new test. The Eocene test, Kern County Land-F in NW SE 1-10n-20w, is scheduled to drill to about 9,000 ft. The second new wildcat will be D-3 San Emidio, in SW SE 32-11n-21w or about 3 miles west of Pleito Creek field.

San Clemente Wildcat Testing

The Texas Co.'s, wildcat near San Clemente in Orange County, approximately 20 miles southeast of nearest oil production, continued to attract attention. With hole bottomed at 7,044 ft. and then plugged back to 4,185 ft., the operator was testing two shows between 3,918 and 4,185 ft. Previously 7-in. casing had been set a 4,341 ft. Location of the wildcat, 1 O'Neill estate, is in 22-8s-7w.

East Los Angeles Test

General Exploration Co. expected to start production tests late last week after setting casing in its 2-A C.C.M.O., third test in the Bandini area of East Los Angeles. With hole bottomed at 6,336 ft., 7-in. casing was set at 6,297 ft. The sand interval open to production reportedly yielded a log quite similar to that of the discovery, completed last September flowing 425 bbl. daily.

ILLINOIS

Illinois Oil Production Up in February

Oil production for Illinois rose in February to an estimated total of 4,882,000 bbl., with daily average of 174,000 bbl., according to Dr. M. M. Leighton, chief of the State Geological Survey. This is the highest daily average recorded for any month since August 1950.

Three wells were brought in with initial productions of 500, 650, and 668 bbl. of oil, the first in Ruark pool in Lawrence County, and the other two in Clay City Consolidated pool in Wayne County.

Operators completed Illinois oil wells in February at the rate of 45 a week as compared with 35 a week for February of last year.

Two oil pools were extended in February: Evers pool in Effingham County and Livingston South pool in Madison County, where one well in each pool extended productive acreage.

Two new oil pays were discovered in two other pools. The lower Ohara limestone is a new producer in Ruark pool in Lawrence County and one of the Pennsylvanian sandstones is a new pay in Iron Consolidated pool in White County.

National Associated Petroleum Co. have completed their fourth discovery in recent weeks on the coal anticline in 6-1e Franklin County, Illinois.

National's 1 Old Ben at South Christopher in 24-6s-1e, produced 160 bbl. on comple-

tion from the Aux Vases sand at a depth of 2,640 ft.

Its 1 Old Ben at North Christopher in 13-6s-1e, was completed in January pumping 100 bbl. a day from the Aux Vases sand at a depth of 2,610 ft.

Also completed in January was National's 1 Valier Coal (Burlington Railroad) at North Valier in 11-6s-1e. This well was completed producing 100 bbl. per day from the Aux Vases at a depth of 2,640 ft.

Its 1 Old Ben in 14-6s-1e was completed in December pumping 60 bbl. a day from the Aux Vases at a depth of 2,636 ft.

The company plans considerable development of the area. The new oil pool, so far unnamed, is about 6 miles west of Benton pool and approximately 80 miles southeast of St. Louis.

These tests of National appear to prove up an area of about 5 square miles.

TEXAS

WEST TEXAS

Andrews Ellenburger Discovery is Completed

Ralph Lowe 1 Deep Rock, in central Andrews County, has been completed for a flowing potential of 407 bbl. of oil a day. Location of the well in Section 5, Block A-46, PSL Survey is on the south flank of the Shafter Lake gas field (upper Permian), and north of the Deep Rock oil sector which has production in Glorietta and Clear Fork pays, both middle Permian in age.

Lowe 1 Deep Rock went into the Ellenburger at 12,230 ft., minus 9,035 ft., and completed from perforations between 12,252-12,278 ft. The completion potential was made after washing with 500 gal. of mud acid. Top of pay was 12,252 ft. Cities Service and Sinclair's deep venture in this area, 1½ miles to the northwest in Section 12, Block 14, found the Ellenburger at 12,395 ft., minus 9,186 ft. It was dry at 12,424 ft. total depth.

In Midland Farms Northeast field, Shell Oil Co. 2-A University failed to make an Ellenburger well but has plugged back to try the Devonian. Location is west of the field Ellenburger discovery, and north of the Devonian opener. Treatment of perforations between 10,960-11,059 ft. resulted in the well kicking off for a 9-hour flow of load oil. Following that it made 82 bbl. of oil in 10 hours through 12/64-in. choke, cut 8 per cent with sediment and water. Plugged back depth was 11,140 ft.

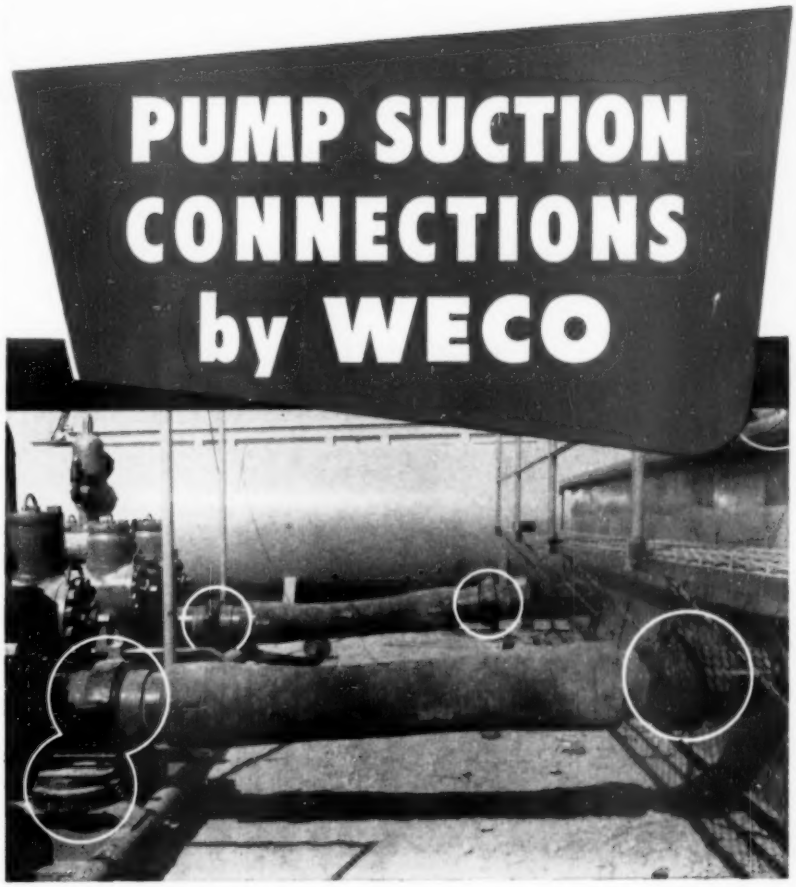
In eastern Andrews County, The Texas Co. 1-B Mabee continued efforts to make a Wolfcamp producer. Swabbing on perforations between 9,793-9,944 ft. produced 77 bbl. of new oil and 10 bbl. of water.

Gulf Oil Corp. has started testing the Devonian in its 1-AE TXL Upton County Ellenburger strike. First test of the Devonian from 11,140-11,200 ft. produced 84 bbl. of oil, plus 21 bbl. of sediment, in 12 hours. A second acid treatment increased the flow to 168 bbl. of oil in 10 hours, through ¼-in. choke. Ellenburger production has previously been established from 12,245-12,348 ft.

Borden County reef discovery . . . Falcon Seaboard Drilling Co. et al 1 Clayton & Johnson in 6-32-T4N-T&P, 5 miles north of Good field, had prospects of making a flush discovery in Pennsylvanian reef pay.

Top of the reef was 8,236 ft., minus 5,783 ft. First test at 8,238-66 ft. had oil in 10 minutes, which flowed at the rate of 25 bbl. an hour. Operators ran casing for completion attempt.

Wolfcamp oil at a west outpost to Reinecke



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pool in southeast Borden County was a possibility at Cosden Petroleum Corp. 1 Griffin, 60-25-H&TC Survey. The well sprayed oil while pulling drill pipe following a test of the Wolfcamp at 6,305-30 ft. Recovery in the pipe was 1,020 ft. of oil and 420 ft. of il and gas-cut mud. Drilling continued on a Canyon reef contract.

Gaines County . . . Rowan Oil Co. 1 Stanton-Brunson, Devonian discovery, flowed oil on the fourth drill-stem test to indicate a potential 125-ft. pay section in that formation. Operators were awaiting decision to complete or drill ahead to the Ellenburger.

The fourth test, from 12,705-12,745 ft., flowed 45 and 40 bbl. of oil on consecutive 1-hour tests. Corrected top on the Devonian was 12,631 ft. and total depth was 12,756 ft.

EAST TEXAS

Further Exploration For Flank of East Texas Field

Another deep well for the west flank of East Texas field, 3 miles northeast of the new Wright Mountain Pettit discovery, has been scheduled. Charles W. Lutes, Longview, will drill 1 Lena Alma Gaines to 8,000 ft. Location is on an 80-acre tract in the Leonard Perkins Survey, Smith County.

In Rusk County, 1½ miles southeast of the East Texas field, Great Expectations Oil Corp. 1 Redwine continued testing in the Pettit lime after making 23 bbl. of oil in 7 hours. Operators cored 52 ft. of saturated section from the upper Pettit at 7,490-7,552 ft., then attempted to drill-stem test the interval but failed due to mechanical difficulties.

Pan American Production Co. 1 Turlington, Pettit and Travis Peak discovery 3½ miles northwest of Tatum in Rusk County, has been completed from both zones. Potential on perforations from 6,988-7,004 ft., identified as the transitional zone between the Pettit and Travis Peak, flowed 30 bbl. of 40° oil a day through ¾-in. choke.

Perforations at 7,144-63 ft. in the Travis Peak produced 3,000,000 cu. ft. of gas a day, plus salt water and distillate. Humble Oil & Refining Co. is also interested in the discovery, and was reported to hold leases in the area.

TEXAS GULF COAST

New Karnes County Field Produces Gas-Distillate

Don F. Tobin and Inca Drilling Co. have a new gas-condensate discovery well in southern Karnes County. The well, 1 Johnson, in Carlos Martinez Grant, 3 miles west of Green, flowed at the rate of 1,650,000 cu. ft. of gas per day with condensate yield estimated at 10 to 15 bbl. per million cubic feet. Flow pressure through ¼-in. choke was 1,115 psi. Pay zone is perforated at 5,703-13 ft. Location is 6 miles from nearest production, in Green field, east of the town of Green.

New Production Proved In Hungerford District

Potential gage of Lenoir M. Josey, Inc.'s discovery well, 1 Charles Keprta, 5 miles north of Hungerford, in Wharton County, recorded a flow rate of 930,000 cu. ft. of gas per day with condensate yield of 1.05 bbl. per million cubic feet. The well, drilled to 8,852 ft., and plugged back to 7,413 ft., is productive from Yegua sand at 7,385-90 ft.

Drilling is under way at the operator's second test, 1 Vasek, 2,116 ft. to the southeast, between the new discovery well and production in the original Hungerford field, 1½ miles to the south.

Wildcat Gasser Completed

A new dry-gas-producing area, located 2¾ miles northwest of Fairbanks, in western Harris County, has been opened with the completion by A. L. Selig, Houston, of his 1 Fischer, a wildcat in the Thomas Hogan Survey. Open-flow potential of the well was calculated at 11,000,000 cu. ft. per day from sand interval at 6,544-53 ft. The well is shut in with pressure of 2,388 psi.

SOUTHWEST TEXAS

Charlotte Area Spreads

Alaska Steamship Co. and Texita Oil Co. have a new extension well at North Charlotte field, 3 miles northwest of Charlotte, in Atascosa County, in their 1 Prassel, completed for 103.64 bbl. of 37.8°-gravity oil daily through ⅜-in. choke. Pay is from open hole at 5,079-95 ft. Gas production was in the ratio of 375 cu. ft. per barrel of oil. Location is 8,300 ft. south of Carter & Carter's discovery well.

New Pay Zone Opened

Another pay zone has been established in Captain Lucey field, Jim Wells County. Discovery well is Lyman-Damascus Operations 3 Erck, completed in sand at 4,969-79 ft. after drilling to 5,404 ft. Potential gage was 144.45 bbl. of 38.1°-gravity oil per day through 13/64-in. choke. Flowing pressure gaged 355 psi. with gas-oil ratio at 386 cu. ft. per barrel.

LOUISIANA

SOUTH LOUISIANA

Third Producer Recorded In Ship Shoal Area Field

Kerr-McGee Oil Industries, Inc., reports the completion of its third gas-condensate well in Ship Shoal Block 28 field, in the Gulf of Mexico, off the coast of Terrebonne Parish.

The new well, 1-C State Lease 750, in Block 28, flowed 80 bbl. of 44°-gravity condensate and 6,640,000 cu. ft. of gas per day through 20/64-in. choke from sand interval at 8,604-28 ft.

The sand is a new-pay discovery. The discovery well for the field, opened in July 1949, produces from sand at 8,482-90 ft. The second well, completed in September 1951, produces from sand at 2,657-62 ft. One dry hole, drilled to 17,697 ft., has been drilled. The three gas wells were drilled to depths below 14,000 ft.

NORTH LOUISIANA

Two Marginal Oil Wells Completed in February

Interstate Natural Gas Co. completed 1 Sibley in 21-11n-12e, for a Tuscaloosa producer in Tensas Parish's St. Joseph area, east-central Louisiana, in February. The discovery flowed 35 bbl. of oil per day through ¼-in. choke by heads from perforations at 9,156 to 9,157 ft.

P. & F. Drilling Co., Inc., had a stripper

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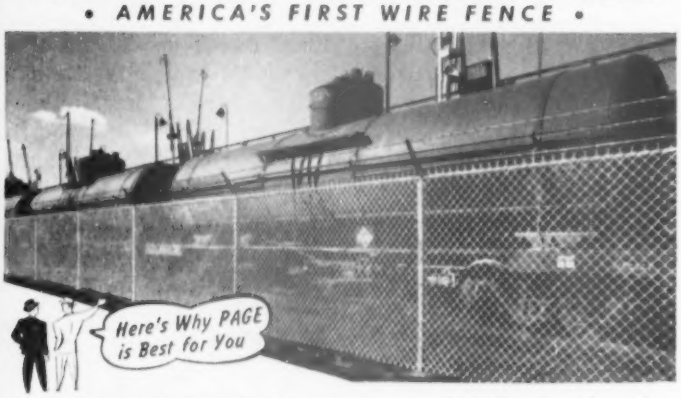

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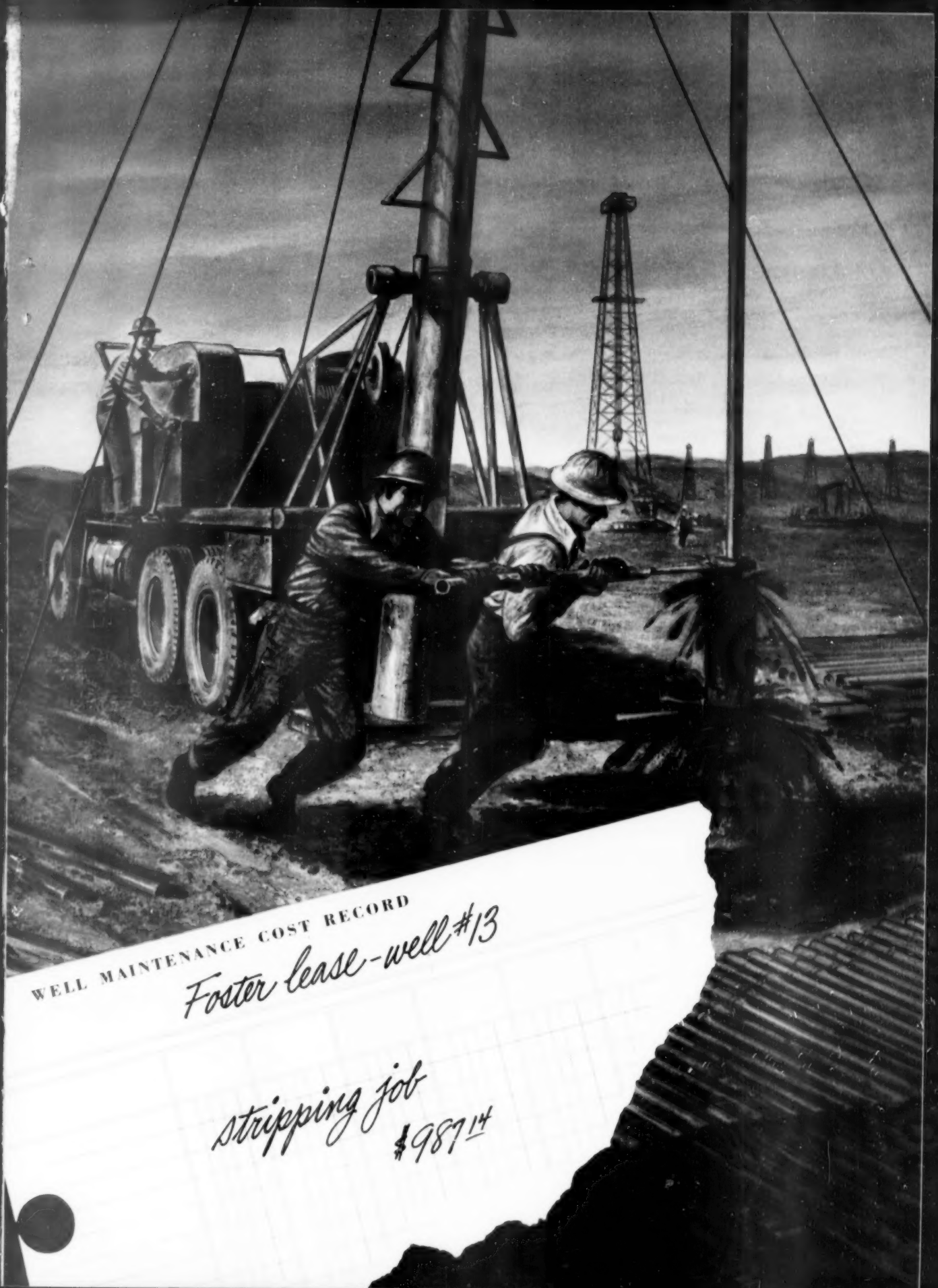

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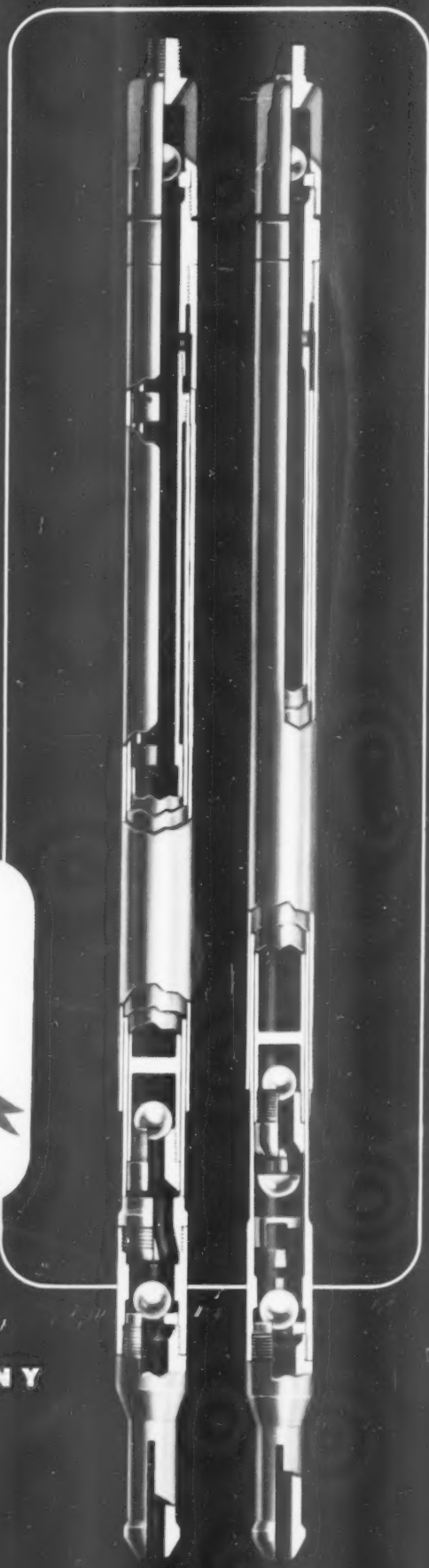

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discovery about 1⅛ miles south of Logansport gas field in DeSoto Parish, west-central Louisiana. The wildcat, 19-11n-15w, pumped 3 bbl. of oil in 14 hours from perforations at 2,755-56 ft. in the Goodland lime. The well is the 1 Olin Industries, Inc.

Esperance Point got Barksdale sand pay in the Wilcox at Jett Drilling Co., Inc. 1 Campbell in 7-5n-9e, Concordia Parish. This is the first Barksdale producer in the field. Production of 105 bbl. of 46.5°-gravity flowing oil was from perforations at 6,553-54 and 6,558-60 ft. Interstate will drill a north offset to the new pay discovery well.

Smackover Producing Co. got a Goodland lime gas discovery in Caddo Parish's Longwood field at 1 Mitchell, 6-18n-16w. The well had a calculated open flow of 1,000 M.c.f. of gas per day from open hole at 2,383-2,400 ft.

E. W. Pfeffer extended Holly field 2 miles to the southwest at 1 Union Central Life Insurance Co. in 22-13n-14w. The well pumped 45 bbl. of oil per day from perforations at 3,077-86 ft.

ROCKY MOUNTAIN

MONTANA

Brorson Confirmation Recovers Oil from Madison

Sun Oil Co. and Phillips Petroleum Co. have reported recovery of free oil on drill-stem test of lower Mission Canyon (Madison) at 2 Dynneson, C SW SW 29-24n-58e, Brorson area, Richland County. The operators tested the interval 9,615-38 ft. with recovery of 360 ft. of free oil, 1,000 ft. of muddy oil and gas-cut water cushion, 530 ft. of heavily oil and gas-cut mud, and 100 ft. of fluffy gas-cut mud. Flowing pressure was 575-760 psi. and shut in pressure was 1,290 psi. Tool was open for 4 hours.

Top of Mission Canyon was tentatively called at 9,056 ft. The operator has cored almost continuously from 9,100 ft. to 9,638 ft. with recovery of limestone with fractures and some shows throughout. There has been no decision to attempt completion in Madison, although such a completion is a possibility. The discovery well was completed in 1953 in Ordovician with production from 12,585-12,605 ft.

Six and one-half miles southeast of Brorson, Sun Oil with Eramont Petroleums, Ltd., and others will definitely attempt completion in Madison at 1 Beagle Land & Livestock, NE SW SW 17-23n-59e, in the North Sidney area. This well recovered some free oil in tests of Mission Canyon from 8,906-9,026 ft. This wildcat is now at 9,437 ft., total depth with fish in hole.

Madison completions at either or both of these wells is held as very important to eastern Montana by observers in the area. Both are seismic prospects, and would stimulate drilling to the shallower formation throughout the area east of the Cedar Creek anticline.

Test Successful at Cabin Creek Confirmation

Shell Oil Co. recovered 5,280 ft. of gassy oil and 333 ft. of oil gassy mud on test of 34-33 Unit, NW SW SE 33-10n-58e, confirmation to the Cabin Creek discovery in Fallon County. Test was of the interval 9,071-9,128 ft. and was of 2½ hours duration. Formation was not identified.

The well is ¾ of a mile southeast of the discovery which had a calculated potential of more than 4,000 bbl. per day from Silurian and Ordovician zones. Completion in the discovery was from the interval 8,688-8,957 ft. Two drill-stem tests above the one reported above also had encouraging recoveries, although they were not of the caliber of the one reported. Shell is drilling ahead below 9,128 ft.

Casing Being Run at North Bloomfield Wildcat

Stanolind Oil & Gas is running casing for tests of Silurian at 1 NPRR, C NE SE 21-20n-52e, in the North Bloomfield area of Dawson County. The well went to total depth of 14,414 ft., with top of Winnipeg reported at 11,314 ft. Some free oil was recovered in drill-stem test of Silurian.

NORTH DAKOTA

Billings County Wildcat Staked

Stanolind Oil & Gas Co. has made location for a deep test in SE SE 17-143n-100w, in the Gorham area of Billings County. The well will go to about 13,500 ft. to test Ordovician. It is 16 miles north and west of production in Fryburg field. Location is on land being drilled under agreement with Northern Pacific Railway.

WYOMING

Deep Big Horn Basin Wildcat Nears Completion

Gulf Oil Corp. has landed casing at 1 Teeters, C SE NW 28-47n-93w, in the Fifteen Mile Creek area of Washakie County, and will test Phosphoria. Casing was set at 12,150 ft. Total depth is 12,203 ft. Staining was found in Phosphoria, but tests recovered only water and gas-cut mud. Gulf had a 1952 discovery in the Fourteen Mile area with substantial production of sour gas and crude from Phosphoria, but no further work has been done in the area until the present test.

Three miles west of 1 Teeters Gulf is coring below 13,159 ft. at 1 Butler-Federal, C SE NW 35-47n-94w. Phosphoria was topped at 13,135 ft. and cores in the formation consisted of dolomite and anhydrite with spotty stain.

Hidden Dome Test is Failure

Stanolind Oil & Gas Co. will abandon 1 Government-Elliott, SW SW SE 29-48n-90w, in the Hidden Dome area of Washakie County. The well went to a total depth of 4,711 ft. in Madison. Cores of Madison were water bearing. Phosphoria cores recovered dolomite, with shows, but analysis indicated the formation noncommercial. The wildcat is just north of Hidden Dome field which produces from Phosphoria and Tensleep as well as Frontier. It was the first test below Tensleep.

COLORADO

Greasewood Area Discovery Flows

S. D. Johnson and Cortlandt Dietler, Denver, reported a flow of 1,200 bbl. of oil per day through ½-in. choke on test of the "D" sand discovery, 1 Spinner, C NE NE 35-6n-61w, Weld County. The wildcat is in the South Greasewood area. These operators now have a second well, 2 Spinner, C NE NE 35-6n-61w, at total depth of 7,200 ft. and casing is being run.

Southeastern Colorado Gas Discovery Shut in

Amerada Petroleum Corp. has tested 1 Newman, NE NE SW 12-32s-42w, Baca County for a flow of 1,665,000 cu. ft. of gas per day and has shut the well in. Production is from perforations in the zone 3,094-3,101 ft. The top of Topeka was called at 2,988 ft. The formation was acidized prior to final testing.

NEBRASKA

Cheyenne County Discovery Completed

Wytex Oil Corp. reported a pump gage of 103 bbl. of oil and 18 bbl. of water per day at 1 Malley, SW SW NE 25-13n-50w, Cheyenne County. Production is from "J" sand, topped at 4,952 ft. The discovery is south and east of the Southwest Sidney area, and is about 2 miles east of nearest production.

NEVADA

Shell Drilling Ahead at Nye County Discovery

Shell Oil Co. is drilling below 6,970 ft. at 1 Unit, SE NE NW 35-9n-57e, in the Eagle Springs area, Nye County. Recoveries in a long cored interval consisted largely of volcanics, according to Shell's reports. Two drill-stem tests last reported from the wildcat recovered additional shows of oil and gas. Test 6,728-6,813 ft. recovered 420 ft. of slightly oily water and 296 ft. of slightly oily, watery mud in 2½ hours. A 506 ft. water cushion was used.

Another test 6,815-6,913 ft. recovered ½-gal. of tarry oil at top of fluid column, 360 ft. of slightly watery mud, with a trace of oil and 87 ft. of muddy water. No water cushion was used.

ARKANSAS

East Stamps Field Opened in Lafayette

C. G. Davis Drilling Co. has opened East Stamps field in Lafayette County at 1 Strange, C W½ NW NW 14-16s-23w, southwestern Arkansas. The discovery well flowed 90 bbl. of 19°-gravity oil per day from perforations at 2,492-95 ft. in the Tokio sand.

In Columbia County Pan-American Engineering Co. 1 Thomas pumped steadily for 23 hours, producing 100 bbl. of 43°-gravity oil for a new discovery at East McNeil, between McNeal and Stephens fields. During the next 24 hours it pumped 50 bbl. of oil and no water. Commercial production is assured in Pettit lime perforations.

KENTUCKY

EASTERN KENTUCKY

In Morgan County, 5-Q-78, Glen McCoun et al. are drilling below 3,680 ft. at 2 A. C. Bradley a wildcat for the eastern portion of the county. Corniferous lime topped at 1,708 ft. proved barren and drilling is continuing

in the Ordovician. No shows have been reported to date.

In Big Sandy gas field and located in the Knott County sector, Kentucky West Virginia Gas Co. have completed 6,166 E. W. Ritchie on Clear Creek as a Mississippian lime producer at a total depth of 2,342 ft. Lime topped at 2,155 ft. yielded an open flow potential of 671,000 cu. ft. of gas daily from 2,307 to 2,323 ft.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: Alaska Steamship Corp. 1 Chupik, Lot 6, Chupik Midway Colony Farms Subd., Nicholas Brouet Sur., A-196. Dry. TD 5,264 ft.

Bastrop County: General Crude Oil Co. 1 Ott, William O'Connell Sur. Dry. TD 8,207 ft.

Forsyth Oil Co. 1 Ingram, J. A. Welchmeyer Lge., A-365. Dry. TD 3,000 ft.

Bexar County: E. A. Rogers 1 Friesenhahn, Fernando Rodriguez Sur., A-15. IPP 10 BOPD, 18°, open hole 1,107-29 ft. TD 1,129 ft. (New field—Leon Creek).

Gonzales County: Continental Oil Co. 1 Schutz, Jacob Kindig Sur. Dry. TD 2,210 ft.

Jim Wells County: LaGloria Corp. 22 Blucher, L. Best Sur., A-363. IP 5,400 M.c.f. daily, open flow, Zula sand 7,330-35 ft. (perforations), and 5,800 M.c.f. daily, open flow, Augustus sand 6,668-80 ft. TD 7,631 ft. (New pay, Augustus sand, in Tijerina-Canales-Blucher field).

W. B. Osborn 1 English, Lavaca Grant, A-166. Shut-in gas well (no gage), perforations 7,420-30 ft., 7,560-78 ft., and 7,582-88 ft. TD 8,992 ft. (New field).

LaSalle County: Stanolind Oil & Gas Co. 1 Martin, J. M. Martin Sur. 696, A-1291. IP 4,700 M.c.f. daily, open flow, perforations 10,096-120 ft. TD 11,019 ft. (New field).

McMullen County: Midstates Oil Corp. 1 Berger unit, Alfred Spaulding Sur. 46, A-912. IP 4,800 M.c.f. daily, open flow, Queen City 6,060-74 ft. TD 8,530 ft. (Extends Hostetter field).

J. M. Gorman 1 Hagist Ranch, L. L. Bode Sur., A-1112. Dry. TD 2,760 ft.

Appell Oil & Gas Corp. and George W. Lyles 2 Atkinson, Section 90, M. deSpain Sur., A-1103. Dry. TD 3,025 ft.

Medina County: F. W. Carr 1 Conring, Section 748, William F. Ritchie Sur. Shut down. TD 1,940 ft.

San Patricio County: The Texas Co. 1 Terry, Albert Von Roeder Sur. 270. Dry. TD 9,810 ft.

Webb County: Bright & Schiff 1 Marrs McLean, Block 2, CCSD&RGNG Sur. 52. Dry. TD 1,685 ft.

Wilson County: Sid Katz et al 1 Rodriguez, Section 18, Francisco Flores Sur., A-10. Dry. TD 3,511 ft.

TEXAS GULF COAST

Brazoria County: C. B. Webster, trustee, 1 Hayes et al, Johnson, Borden & Walker Sur. 32, A-77. Dry. TD 10,520 ft.

Union Producing Co. 1 Slover et al, Lots 27 and 34, ACH&B Sur. 25, A-412. Dry. TD 10,250 ft.

Brazos Oil & Gas Co. 1 Stringfellow, H. C. Weaver Sur., A-381. Dry. TD 7,000 ft.

Fort Bend County: J. R. Butler et al 1 Dew, I&GN Sur., A-264. Dry. TD 8,610 ft.

Harris County: Geotex Oil Co. and Newman Brothers Drilling Co. 1 Ziegenhain, R. T. Blackburn Sur., A-168. IP 127 BOPD, 3/8-in., 37°, Cockfield 5,843-45 ft. (perforations). TD 7,400 ft. (New field.)

Simonton & Talley 2 Mitchell, John Edwards Sur., A-20, and C. D. Crenshaw Sur., A-204. Dry. TD 6,100 ft.

Jackson County: W. Earl Rowe 3 Regina Gayle estate, Nestor Clay Sur., A-13. Dry. TD 6,200 ft.

Jefferson County: Deep South Oil Co. Wolfe, T&NO Sur. 156, A-657. IP 72,000 M.c.f. daily, open-flow potential, perforations 8,500-26 ft. TD 9,372 ft. (Extends Stowell-Winnie field.)

Liberty County: R. H. Abercrombie et al 1 McHard-Swilley, Thomas W. Key Sur., A-303. Dry. TD 8,149 ft.

John W. Mecom and Freeport Sulphur Co. 1 White, L. G. Wilburn Sur., A-400. Dry. TD 11,710 ft.

Live Oak County: Leo Harper 1 Hinnant, SK&K Sur., A-451. Dry. TD 5,819 ft.

Matagorda County: Geier-Jackson et al 1 Sherrill, Tract K, Z. Woods Sur., A-108. Dry. TD 9,136 ft.

Montgomery County: Moran Corp. and Gulf Coast Lease-Holds, Inc., 1 Cox, L. H. Washington Sur., A-63. Dry. TD 6,551 ft.

Victoria County: Kirby Petroleum Co. 1 Clegg, L. Navarro Sur., A-89. Dry. TD 8,707 ft.

P. R. Rutherford et al 1-G Shelton et al, Eugenio Benavides Sur., A-5. Dry. TD 7,528 ft.

Wharton County: Lenoir M. Josey, Inc., 1 Keprta, J. W. Moore Sur., A-44. IP 930 M.c.f. daily, open-flow potential, Yegua 7,385-90 ft. (perforations). TD 8,852 ft. (Extends Hungerford field.)

EAST TEXAS

Anderson County: Jack & Delbert Powell 1

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Tyler, Newton Lewis Sur. Dry. TD 6,214 ft.

Cherokee County: Wise Drilling Co. 1 Slider, D. J. Hill Sur., A-387. Dry. TD 5,111 ft.

Gregg County: Ace Oil Co. and J. C. Robbins 1 Grissom, Dinsmore Simpson Sur. Dry. TD 7,209 ft.

Hunt County: Byars, Peveto and Stephens 1 Lou Prince, Amos Smith Sur., A-945. Dry. TD 3,685 ft.

Navarro County: Brown & Wheeler 1 Drane, Evan Lowery Sur., A-476. Dry. TD 2,505 ft.

Faultline Drilling Co. 1 Walker, J. H. Millican Sur., A-523. Dry. TD 1,800 ft.

Smith County: Sun Oil Co. 39-B Pace, Juan Vargas Sur., A-22. IPP 17.25 BOPD, 41°, Pettit 7,830 ft. TD 8,202 ft. Located on West flank of East Texas field.

WEST CENTRAL TEXAS

Callahan County: J. E. Conlee 1 McDaniel, Sec. 73, BBB&C Sur. Dry. TD 1,828 ft.

Miami Operating Co. 2 Finley, Sec. 72, BOA Sur. Dry. TD 4,162 ft.

Throckmorton County: Mid-Continent Petroleum Corp. 1 Brown, Sec. 201, BBB&C Sur. Dry. TD 5,331 ft.

NORTH TEXAS

Archer County: Harvey Drilling Co. 1 Hoff, Blk. 5, Clark & Plumb Subd. Dry. TD 3,801 ft.

Tom B. Medders 1 Pokormy, L. Napoleon Sur., A-728. Dry. TD 4,910 ft.

Cooke County: Snuggs & Cox 1 Henderson, L. Zumalt Sur., A-1176. Dry. TD 3,971 ft.

Grayson County: J. R. and Adam Seitz 1 Bowling, W. G. Miller Sur., A-780. IPP 23 BOPD, 25°, Strawn 3,883-90 ft. TD 4,401 ft.

Hardeman County: Delfern Oil Co. 1 Terry, 354-H-W&NW Sur. Dry. TD 7,014 ft. Elev. 1,621 ft., Canyon 5,300 ft.

Jack County: Bridwell Oil Co. 4 Prideaux, Elizabeth Smith Sur., A-524. Dry. TD 650 ft.

Bridwell Oil 5 Prideaux, Elizabeth Smith Sur., A-524. Dry. TD 661 ft.

L. T. Burns 1-A Starnes, James Watson Sur., A-884. Dry. TD 4,700 ft.

Wilbarger County: Dublin-Kiel 1-M Waggoner, 36-4-H&TC. Dry. TD 2,605 ft.

Lloyd Patton 1-A Waggoner, 21-5-H&TC. Dry. TD 2,560 ft.

WEST TEXAS

Andrews County: Cities Service Oil Co. 4-O University, 22-12-University Lands. IP 1,456 BOPD, 26/64-in., 43°, Ellenburger 10,100 ft. TD 10,195 ft.

Forest Oil Corp. et al 1-C University, 20-4-University Lands. IP 509 BOPD, 13/64-in., 47°, Pennsylvanian 10,606 ft. TD 14,027 ft.

Borden County: J. E. Jones Drilling Co. 2 Miller, 12-33-T4N-T&P, 13 mi. SW Gail. IP 348 BOPD, 36-in., 39°, lower Spraberry pay 7,095 ft. TD 8,358 ft.

Coke County: Cosden Petroleum Corp. 1 Laswell, Stanton Field Sur. 1. Dry. TD 6,011 ft.

Crane County: Humble Oil & Refining Co. 5 Cowden, 25-X-CCSD&RGNG. IP 373,000 cu. ft. gas, 20/64-in., pay 7,120 ft. TD 10,510 ft.

Richardson Oils, Inc., 1 Wirt Davis, 39-4-H&TC. Dry. TD 7,578 ft.

LaGorce Oil Co. 2 Holt, 62-OP-GC&SF. Dry. TD 1,525 ft.

John L. and P. D. Moore 1-S Conoco-Shannon, 10-10-GC&SF. Dry. TD 1,936 ft.

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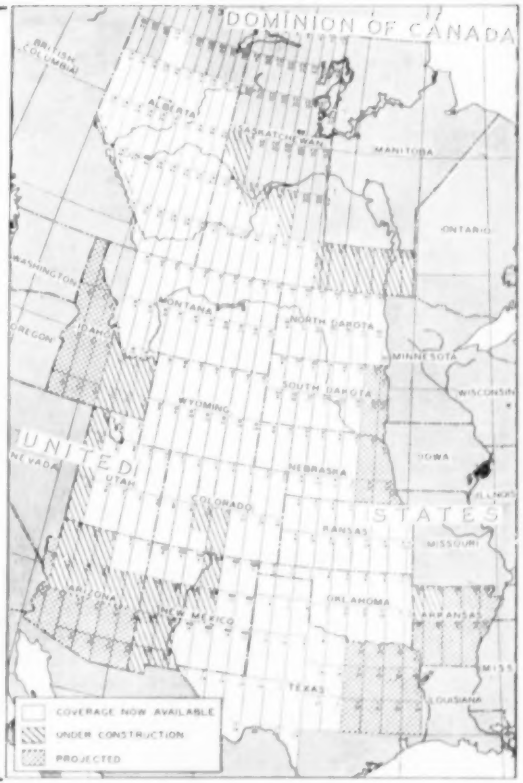

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WILDCAT COMPLETIONS

Garza County: Head Drilling Co. and Alexander Associates 1 Piggott Heirs, Sec. 4, W. H. Cobb Sur. Dry. TD 3,610 ft.

Pecos County: Brown & Thorp Drilling Co. 1 Magnolia fee, 102-11-H&GN. Dry. TD 3,070 ft.

Joseph I. O'Neill, Jr. 1 Brownell-McGrew, 13-105-GC&SF. Dry. TD 6,065 ft. Elev. 2,582 ft., Ellenburger 5,735 ft.

Runnels County: G. W. Strake 1 Bryan, J. Earle Sur. 449. Dry. TD 5,282 ft.

Woodson Production Co. 1 Roper, Sec. 436, M. T. King Sur. Dry. TD 4,207 ft.

Schleicher County: Homer E. Ogden 1 Willoughby, 130-A-HE&WT. IPP 18.7 BOPD, 33°, pay 712 ft. TD 775 ft.

Scurry County: W. L. Meadows 1 Browning, 489-97-H&TC. Dry. TD 2,875 ft.

Sutton County: Phillips Petroleum Co. 1 Rieley, 21-5-TW&NG. Dry. TD 4,635 ft.

Tom Green County: Stanolind Oil & Gas Co. 1-B Johnson, J. M. Swisher Sur. 79½. Dry. TD 6,979 ft. Elev. 2,177 ft., Ellenburger 6,208 ft., Wilburns 6,950 ft.

SOUTHEAST NEW MEXICO

Lea County: Warren Petroleum Corp. 1 Federal-Mills, 11-9s-36e. IP 1,560 BOPD, ½-in., 47°, Pennsylvanian 9,673 ft. TD 9,698 ft.

Eddy County: S. P. Yates 1 State, 28-19s-28e. IPP 5 BOPD, 30°, pay 1,114 ft. TD 4,081 ft.

NORTHERN NEW MEXICO

McKinley County, San Mateo dome: Superior Oil Co. 25-14 Government, NE NW SW 14-14n-8w. Dry. TD 6,253 ft. in pre-Cambrian.

ILLINOIS

Bond County: Hoiles Petroleum Co. 1-A Malan, NE SE NW 22-5n-3w. Dry. TD 498 ft.

Clark County: J. C. Bennett 1 Evans, SE SE SE 22-9n-12w. Dry. TD 1,180 ft.

Clay County: N. V. Duncan 1 Payne, NE SW NW 27-4n-8e. Dry. TD 3,151 ft.

Crawford County: R. B. Kintop 1 Jones, SW SE SE 19-6n-11w. Dry. TD 1,008 ft.

Madison County: R. W. Hays et al 1 Noll, NE NE SW 13-4n-7w. Dry. TD 1,780 ft.

INDIANA

Dubois County: George & Wrather 1 Troxler, SW NE NW 24-1s-5w. Dry. TD 775 ft.

E. W. Pielmier 1 Himsel, NE NW NE 7-1s-4w. Dry. TD 770 ft.

Pike County: J. C. Westfall 1 Miller, SE SW NE 26-1s-9w. Dry. TD 1,690 ft.

KENTUCKY

Henderson County: Ryan Oil Co. 1 Morehead, SE NW SW 25-O-22. Dry. TD 2,788 ft.

Muhlenberg County: Deimerle & Flynn 2(3) Talbert, NE SW SW 21-H-30. Dry. TD 742 ft.

MICHIGAN

Huron County: J. O. Mutch 1 Krinkie, SW NW NW 27-18n-13e. Dry. TD 2,971 ft. in Detroit River.

Lenawee County: C. W. Collin 1 Gillespie, SW SE NW 15-5s-4e. Dry. TD 1,008 ft. in Dundee.

Muskegon County: Ace Oil Co. 2 Ames-Weet-Lidke, NW NE SW 16-12n-16w. Dry. TD 1,875 ft. in Traverse lime.

Van Buren County: Walter Creech 1 Abbott, SE SE SE 26-4s-14w. Dry. TD 1,119 ft. in Traverse lime.

Washtenaw County: Sun Oil Co. 1 Eschelbach, SE SW SE 30-2s-4e. Dry. TD 1,422 ft. in Dundee.

PENNSYLVANIA

Lycoming County: Delta Drilling Co. 1 Ambrose Ging, Warrensville Quad. Sec. B 4,600 ft. north of south line, 7,200 ft. east of west line. Dry. TD 8,140 ft. through Oriskany sandstone.

The California Co. 1 Byron Schnyder. Dry. TD 6,642 ft. in Oriskany sandstone.

FLORIDA

Holmes County: Lyle Cashion Co. et al 1 Russell, near C NE NW 32-5n-16w. Dry. TD 4,192 ft. Elev. 81 ft., lower Tuscaloosa 4,032 ft.

ALABAMA

Escambia County: George Hunt 1 McMillan trust, C NE SW 21-3n-10e. Dry. TD 5,941 ft. Elev. 210 ft., lower Cretaceous 5,606 ft.

MISSISSIPPI

Franklin County: Pure Oil Co. 1 Board of Supervisors, 16-7n-3e. Dry. TD 313 ft.

Pure Oil Co. 1 Ezell heirs, C SE NW 15-7n-3e. Dry. TD 10,834 ft. Elev. 285 ft., lower Cretaceous 10,781 ft.

Leflore County: Marshall R. Young 1 Kennedy, C NW NE 23-21n-1e. Dry. TD 3,278 ft.

SOUTH LOUISIANA

Calcasieu Parish: Sun Oil Co. 8 Lutcher-Moore, 12-8s-13w. IP Shut-in gas well, no gage, perforations 7,062-92 ft. TD 10,300 ft. (New pay in North Starks field.)

Cameron Parish: Royalite Oil Co. 1 State Lease 2353, 33-15s-3w. IP 21.5 BCPD and 2,620 M.c.f. daily, 12/64-in., 56°,

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perforations 9,089-92 ft. TD 11,010 ft. (New pay in Deep Lake field.)

Plaquemines Parish: Continental Oil Co. 5 State Lease 978-Blk. 53, Blk. 53, West Delta area, IP 2.1 BCPD and 1,232 M.c.f. daily, 10/64-in., perforations 6,348-56 ft. TD 11,060 ft. (New pay in West Delta Blk. 53 field.)

St. Landry Parish: D. E. Vasser and A. H. Howard 1 St. Charles College, 144-7s-4e. Junked hole. TD 9,812 ft.

St. Martin Parish: Continental Oil Co. 1-B Jeanerette, 11-13s-11e. IP 323 BOPD, 10/64-in., 31.6°, perforations 11,930-40 ft., and 20 BCPD and 1,839 M.c.f. daily, 9/64-in., 46.9°, perforations 12,182-203 ft. (dual completion). TD 11,205 ft. (New field-Bayou Long.)

NORTH LOUISIANA

Concordia Parish: R. A. Campbell 2 Graham, 59-5n-9e. Dry. TD 7,205 ft.

Grant Parish: F. A. Callery, Inc. 1 Nebo Oil Co., Inc., 31-9n-1w. TD 4,050 ft.

Ouachita Parish: Atlantic Refining Co. 1 Livviee McBride, strat test, 26-17n-1e. Dry. TD 4,717 ft.

ARKANSAS

Miller County: B. F. Snowden 1 Fouke estate-YWCA, 30-15s-27w. Dry. TD 5,011 ft.

Union County: Burnett Producing Co. 1-A Stephens, C NW NW 16-18s-13w. Dry. TD 3,809 ft.

White County: W. W. Parks 1 Lum Walker, C NW SW NW 28-6n-5w. Dry. TD 1,065 ft.

Irene Oil & Gas Corp. 2 Self estate, 29-6n-5w. Dry. TD 1,065 ft.

OKLAHOMA

Choctaw County: Harry Kithos 1 Arno, SE SE SW 35-5s-14e. Dry. TD 2,250 ft.

Grady County: Helmerich & Payne, Inc. 1 Harrison, C NE SE 31-3n-5w. Dry. TD 13,010 ft.

Vickers Exploration 1 Brown, C SE SE 22-5n-5w. Dry. TD 10,328 ft.

Hughes County: Bates Block 2 Gaddy, SE NW NW 2-5n-10e. Dry. TD 1,805 ft.

Kay County: Dick Shaffer et al 1 Parker, SW NE NE 9-28n-1e. Dry. TD 3,356 ft.

Kiowa County: Huffman & Malloy 1 Smith, NE SE NE 12-7n-16w. Dry. TD 2,433 ft.

Murray County: Emma C. Greer 1 Peirce et al, SE SE NE 27-1n-2e. Dry. TD 846 ft.

Noble County: Robert L. Kinkaid 1 Emick, SE SE NW 22-21n-3e. Dry. TD 4,422 ft.

Pawnee County: Dave Morgan 1 Kelley, SW NE SW 18-23n-5e. Dry. TD 3,471 ft.

Payne County: Wilcox Oil Co. 1 Denny, NE NE NE 10-19n-3e. Dry. TD 4,511 ft.

Pontotoc County: Okla-Tex Oil Corp. 1 Busby, SW NW NE 8-4n-8e. IPP 2 BOPD, Senora 731-41 ft., 36°, TD 2,207 ft. (Oil well.)

Sequoyah County: Highland Hills, Inc. 1 Kilgore, SW SW SW 3-12n-24e. Dry. TD 1,380 ft.

KANSAS

Barber County: K&E, Mayflower Minerals et al 1 Garner, NE NE NW 11-33s-10w. Dry. TD 4,970 ft.

Barton County: Natural Gas & Oil Corp. 1 Janke "A," SE NW NE 7-18s-11w. Dry. TD 3,395 ft.

Butler County: Eckland Drilling Co. 1 Blood, C N½ NE 29-28s-3e. Dry. TD 2,509 ft.

Ellis County: Bay Petroleum Co. and Strain Drilling Co. 1 Roth, SE NE SE 16-15s-17w. IPP 116 BOPD, Arbuckle 3,522-31½ ft. TD 3,531 ft. (New pay at Degenhart pool.)

Ellsworth County: Don Ingling 1 Hughes, SE SE NW 21-15s-6w. Dry. TD 3,772 ft.

Graham County: Aurora Gasoline Co. 1 Dreiling, SE SE NE 20-10s-22w. Dry. TD 4,070 ft.

McPherson County: J. S. Cling et al 1 Neel, SW NE SW 8-19s-5w. Dry. TD 3,552 ft.

Norton County: Trans-Era 1 Humphrey, N½ NE NE 25-3s-25w. Dry. TD 3,730 ft.

Alpine Oil & Royalty Co. 1 Haresby, NW SW NE 7-4s-23w. Dry. TD 3,867 ft.

Osborne County: Texas-Pacific Coal & Oil Co. 1 LaRosh, NW NW SE 23-8s-14w. Dry. TD 3,740 ft.

Rush County: Coppinger 1 Smith, SW SW SE 18-19s-18w. Dry. TD 4,200 ft.

Stafford County: Natural Gas & Oil and Oklahoma Exploration 1 Van Lieu, SE NW SW 28-24s-13w. IPP 116 BOPD, Arbuckle 4,180-84 ft., 35°, TD 4,195 ft. (Opens Centerview pool.)

Wallace County: States Oil Co. 1 Hill, C NW SE 36-11s-42w. Dry. TD 5,233 ft.

WESTERN NEBRASKA

Cheyenne County: Shell Oil Co. 1 Stueve, NE NE NE 20-14n-52w. Dry. TD 5,514 ft.

Wytex Oil Co. 1 Malley, SW SW NE 25-13n-50w. IPP 103 BOPD, "J" sand discovery, opens Malley field. TD 5,030 ft.

H. E. Zoller 1 Johnson, SW NW NW 8-14n-48w. Dry. TD 4,736 ft.

Kimball County: Murphy Corp. and Ashland Oil & Refining Co. 1 Kleinholtz, SE SW NW 21-14n-53w. Dry. TD 5,783 ft.

CALIFORNIA

Fresno County: Standard Oil Co. of California 3-33-F, SW NW 33-20s-16e, IPF 1,095 BOPD on 12-hour gage, 36/64-in. choke, 35.5° gravity, perfs. 8,325-58 ft., TD 8,405 ft. (Approx. ¼-mile east ex-

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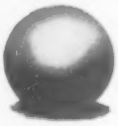

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WILDCAT COMPLETIONS

tension to one-well West Guijarral Hills field, Leda sand pool).

J. K. Wadley et al 1 Anderson Clayton Co., 20-13s-14e. Dry. TD 6,615 ft.

Kern County: J. D. ManleyIII, 72 19-B, 19-31s-23e. Dry. TD 6,021 ft.

Miller & York Oil Operations 1 Armstrong, 26-29s-27e. Dry. TD 3,799 ft.

Standard Oil Co. of California 35 C.C.M.O.-4, 32-11n-19w. Dry. TD 13,239 ft.

Superior Oil Co. 31-30 Superior-Anderson, 30-29s-21e. Dry. TD 5,002 ft.

Los Angeles County: California Western Oil Co. 1 Koolhaas, 29-3s-11w. Dry. TD 3,102 ft.

Madera County: J. T. Wicker 7 "Well," 11-11s-17e. Dry. 2,375 ft.

Orange County: Drilling & Exploration Co. 1 Drilexco - State - Bennett, 32-3s-9w. Dry. TD 5,884 ft.

Sacramento County: Artnell Oil & Gas Co. 1A Hansen, 18-6n-5e. Dry. OWRD redrilled to 3,505 ft., TD 4,501 ft.

San Bernardino County: Retari Co., Inc. 1 Retari, 25-2n-5e. Dry. TD 339 ft.

San Luis Obispo County: N. B. Hunt 1 Tar Springs, 25-32s-14e. Dry. TD 10,010 ft.

Ventura County: Macson Oil Co. 3 Strathearn, 6-2n-18w. Dry. TD 500 ft.

MONTANA

Fergus County, Winifred area: Morgan & Edwards 1 Humphrey, C NE SE 15-21n-17e. Dry. TD 3,925 ft. in Mission Canyon.

Gallatin County, West Yellowstone: J. H. Morgan, Sr. 1 Government, C SW SW 22-13s-5e. Dry. TD 1,390 ft. in lava.

Musselshell County, East Devil's Basin area: Continental Oil Co. 1 Alt, NE SE 19-10n-26e. Dry. TD 3,655 ft. in Otter.

Rosebud County: Hanco Oil & Gas Co. 1 Government, SE SW NW 14-7s-42e. Dry. TD 5,400 ft. in Parkman.

NEVADA

White Pine County, Ibatah area: Gulf Oil Corp. 1 Dennison-Federal, NE NW SW 20-26n-70e. Dry. TD 4,498 ft. in Permian.

WYOMING

Big Horn County, South Manderson: L. J. Peterson 2 Wycol-Government, C SW NW 1-49n-92w. IPP 97 BOPD, 35.3°, Tensleep discovery, new pay. TD 5,999 ft. in Amsden.

Crook County: Parrent Oil Co. 1 Buckmiller, NE SE SW 22-50n-57w. Dry. TD 1,374 ft.

Laramie County, Pine Bluffs: J. D. Leftwich 1 Prosser, C SW SE 14-41n-61w. Dry. TD 7,740 ft. "J" sand.

Sweetwater County, Alkali Creek: Chicago Corp. and Republic Natural Gas Co. 1 Foreman, W½ SW SE 7-13n-99w. Dry. TD 7,886 ft. in Mesaverde.

The Texas Co. 5 Unit, C SE NE 2-18n-98w. IP 8,690 M.c.f. of gas per day, Mesaverde sand gas discovery at Table Rock, new field. TD 10,077 ft. in Baxter.

COLORADO

Adams County: Howard Chamlee and O'Donnell & Edmondson 1 Irey, NE NE SE 30-1s-57w. Dry. TD 5,905 ft.

El Paso County: C. R. Nigh 1 Jarrett, C SE SE 12-12s-60w. Dry. TD 6,227 ft.

Logan County: British-American 1 Feik, C NE SW 5-8n-54w. IPP 141 BOPD, "J" sand discovery, new field. TD 5,403 ft.

British-American 1 Zuhlke, C NW NW 9-8n-54w. Dry. TD 5,460 ft.

British-American 1 Tetsell, C NW NW 32-9n-53w. Dry. TD 5,074 ft.

British-American 1-E Yenter, C NE SE 18-9n-54w. Dry. TD 5,520 ft.

K. D. Owen 1 State, SE SE NE 36-8n-55w. Dry. TD 5,350 ft.

Moffat County, Wilson Creek area: The Texas Co. and The California Co. 40 Unit, C SW 18-3n-94w. Dry. TD 7,727 ft. in Entrada.

Washington County: Gem Oil Co. 1 Peters, SW SW SW 7-1n-54w. Dry. TD 5,035 ft.

MANITOBA

Northern 3-17 Nelly Lake, LSD 3, 17-1-21w1. Dry. TD 3,395 ft.

SASKATCHEWAN

Tide Water 1 Goldburg Crown, LSD 13, 22-33-16w3. Dry. TD 3,209 ft.

Alminex 7-19 Crystal, LSD 7, 19-30-27w3. Dry. TD 2,870 ft.

ALBERTA

Stanolind et al 1 Ardley unit well, LSD 3, 18-38-23w4. Dry. TD 4,946 ft.

Sun 4A5 Haig Lake, LSD 4, 5-106-4w6. Dry. TD 7,523 ft.

Stanolind-H. B. "D" 1 Pembina Crown, LSD 8, 36-48-10w5. Indicated Cardium oil well. TD 6,695 ft.

Imperial 9-12-118-21 Indian Creek, LSD 9, 18-118-21w5. Dry. TD 4,577 ft.

BRITISH COLUMBIA

Pacific Union 1 Buick Creek. Unsurveyed territory. Triassic gas well. TD 4,790 ft.

NORTHWEST TERRITORIES

N.W.T. 1 Heart Lake, Unsurveyed territory. Dry. TD 1,757 ft.

Fourth Well Completed In New Louisiana Field

Production in the new Franklin field, south of Franklin, in St. Mary Parish, Coastal Louisiana, has been extended a location westward with the completion by Fidelity Oil & Royalty Co. of its 1 Lucia, flowing at the rate of 170 bbl. of 30.2°-gravity oil per day from sand interval at 11,865-880 ft.

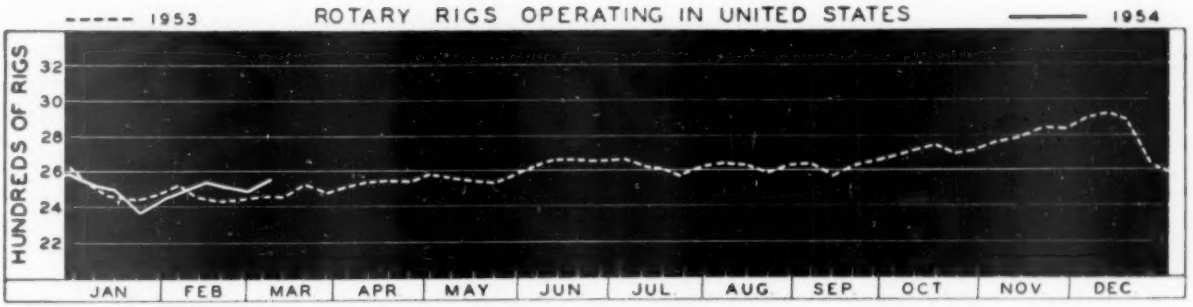
The field, opened last September by Southern Natural Gas Co., now has two oil producers and two gas-condensate wells. The new well is the first for Fidelity.

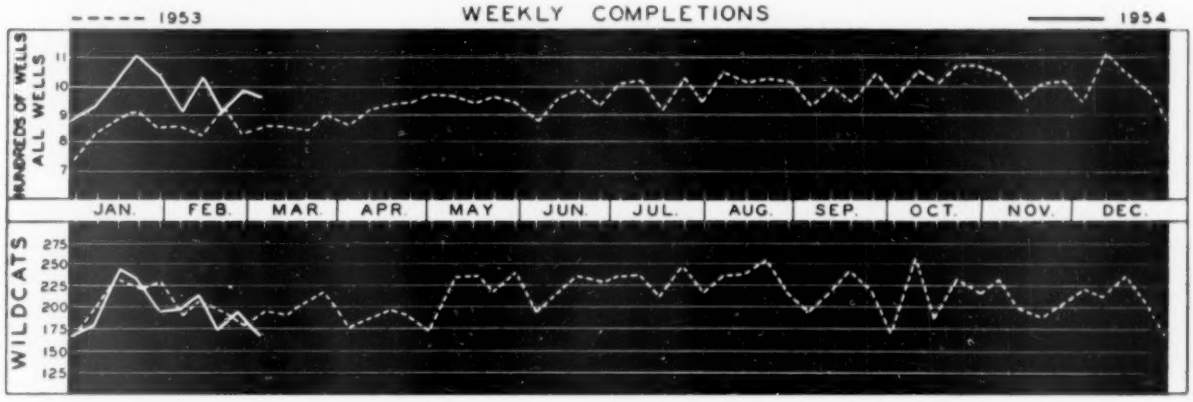
LEGAL

Sealed bids for oil and gas mining leases on 12,821.75 acres of trust lands on the Crow Indian Reservation Big Horn County, State of Montana, will be received at the Office of the Superintendent of Crow Indian Agency, Crow Agency, Montana, up to 2:00 o'Clock P.M. (MST) Friday, March 19, 1954. For further information, call or write L. C. Lippert, Superintendent, Crow Indian Agency, Crow Agency, Montana.

LEGAL

1,280.28 acres of Allotted Indian lands, in 29 separate tracts, located on the Uintah and Ouray Indian Reservation, Townships 1 and 2 North, Ranges 1 East and 1 West, Uintah Special Base and Meridian Survey, Uintah County, State of Utah, are being advertised for oil and gas lease sale, bids on which will be opened 2:00 P.M., March 16, 1954, at the Uintah and Ouray Agency, Harry W. Gilmore, Superintendent, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.





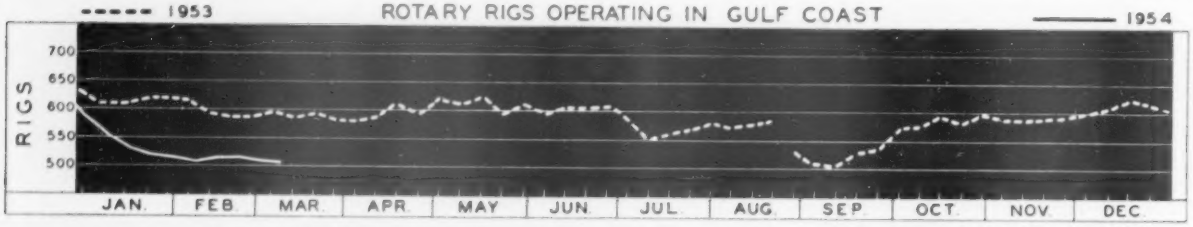
CURRENT STATISTICS

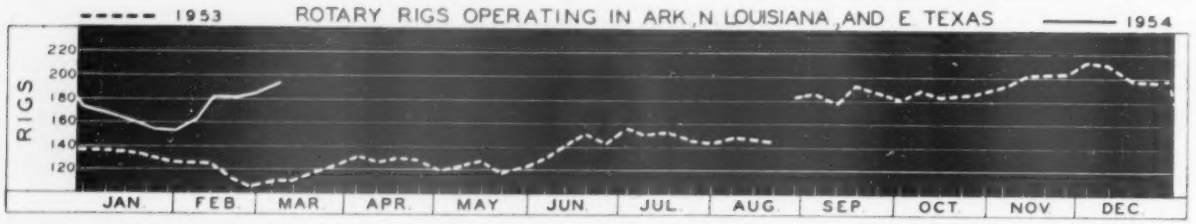
EXPLORATION

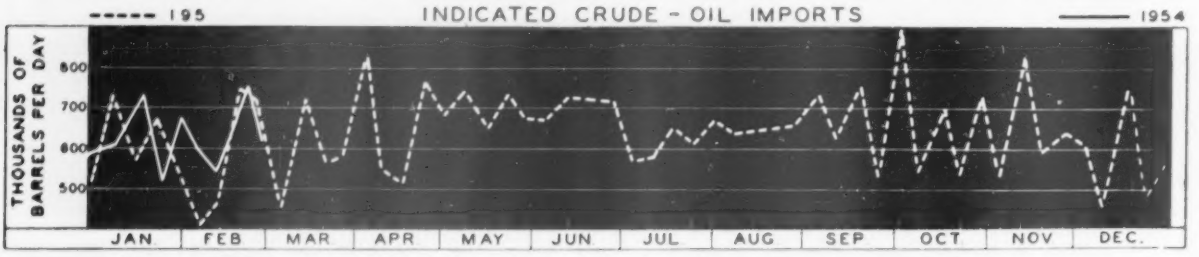
WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 6, 1954

	Total of all wells					Mar. 6		Wildcat completions and discoveries					Cumulative total, 1954				
	Comp.	Oil	Gas	Dry	Footage	1954	1953	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Pennsylvania-New York	40	18	3	*19	56,502	432	394	0	0	0	2	2	0	0	1	8	9
West Virginia	10	1	7	2	32,050	97	87	0	0	0	0	0	0	0	4	3	7
Ohio	23	10	5	†8	57,558	174	173	0	0	0	0	0	0	0	2	1	3
Indiana	16	7	0	9	22,494	131	224	0	0	0	3	3	0	0	0	28	28
Kentucky	25	13	0	12	39,576	196	172	0	0	0	2	2	4	0	0	24	28
Illinois	38	13	0	25	93,910	463	346	0	0	0	5	5	0	0	0	77	77
Michigan	11	3	0	8	24,406	116	105	0	0	0	5	5	0	0	0	53	53
Kansas	72	38	6	‡28	245,712	766	842	2	0	0	11	13	9	0	2	97	108
Nebraska	11	4	0	7	61,067	69	51	1	0	0	3	4	5	0	0	18	23
Oklahoma	162	98	4	§60	519,055	1,705	1,262	1	0	0	11	12	20	2	5	114	141
Texas	296	168	25	103	1,399,957	3,156	2,921	8	3	4	54	69	138	18	32	735	923
North Central (Dist. 7-B & 9)	86	53	0	33	266,979	1,120	1,067	1	0	0	12	13	71	2	2	278	353
West (Dist. 7-C & 8)	85	59	2	24	475,686	745	690	4	0	1	11	16	37	0	4	139	180
Panhandle (Dist. 10)	14	5	6	3	52,214	157	148	0	0	0	2	2	0	0	2	13	15
Eastern (Dist. 5 & 6)	22	6	8	8	126,040	133	136	1	0	0	6	7	4	0	3	36	43
Gulf Coast (Dist. 2 & 3)	42	21	3	18	286,319	515	420	1	1	1	13	16	14	7	10	130	161
Southwest (Dist. 1 & 4)	47	24	6	17	192,719	486	460	1	2	2	10	15	12	9	11	139	171
Louisiana	55	41	2	12	347,987	611	491	1	2	1	3	7	17	10	6	51	84
Northern	29	24	1	4	85,732	323	230	0	0	0	2	2	3	0	0	13	16
Southern	26	17	1	8	262,255	288	261	1	2	1	1	5	14	10	6	38	68
Arkansas	18	9	1	8	60,627	142	86	0	0	0	4	4	5	0	0	20	25
Mississippi	7	3	0	4	39,512	67	73	0	0	0	3	3	2	0	0	24	26
Southeastern States	2	0	0	2	10,133	24	26	0	0	0	2	2	1	0	1	18	20
Montana	6	1	0	5	26,107	54	81	0	0	0	4	4	1	0	0	17	18
Wyoming	27	22	1	4	165,824	285	109	1	0	1	3	5	10	0	2	36	48
Colorado	31	20	0	11	182,383	196	94	1	0	0	9	10	7	0	0	76	83
Utah	0	0	0	0	0	10	16	0	0	0	0	0	0	0	0	4	4
New Mexico	26	20	4	2	158,568	248	248	2	0	0	1	3	4	0	1	33	38
California	45	32	0	13	219,370	444	459	1	0	0	12	13	15	0	4	95	114
North Dakota	0	0	0	0	0	35	48	0	0	0	0	0	1	0	0	10	11
Miscellaneous (Mo., Tenn., Nev.)	44	8	2	34	62,253	50	12	0	0	0	1	1	0	0	0	7	7
Total United States	965	529	60	376	3,825,051	9,471	8,320	18	5	6	138	167	239	30	60	1,549	1,878
Total previous week	999	575	74	350	4,110,275			32	3	9	147	191	221	25	54	1,411	1,711
Total March 7, 1953	865	451	75	339	3,560,131			28	0	9	159	196	257	20	61	1,581	1,919

Service wells included: *17, †3, ‡1, §7.





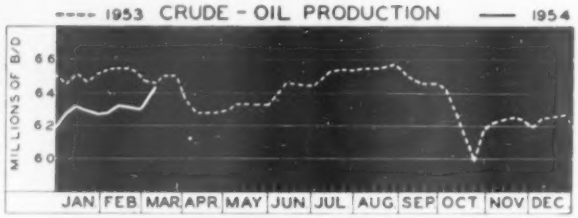


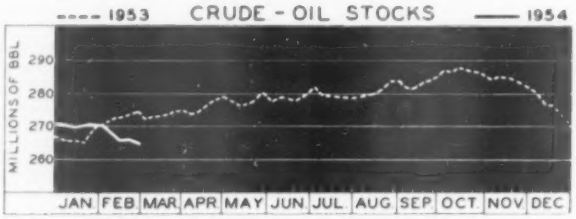
DAILY AVERAGE PRODUCTION FOR WEEK

	March 6			Feb. 27
	Crude oil	Lease condensate	Total	total
Alabama	4,400		4,400	4,300
Arkansas	75,600	600	76,200	75,350
California	1,001,000		1,001,000	1,001,800
Colorado	113,300		113,300	114,400
Eastern	58,000		58,000	58,000
Florida	1,475		1,475	1,450
Illinois	179,900		179,900	177,500
Indiana	31,400		31,400	31,300
Kansas	320,800		320,800	306,500
Kentucky	34,300		34,300	34,700
Louisiana	641,350	48,700	690,050	675,250
North	108,500	3,700	112,200	112,250
South	532,850	45,000	577,850	563,000
Michigan	33,100		33,100	33,700
Mississippi	89,200	3,800	93,000	92,400
Montana	35,100		35,100	35,600
Nebraska	19,000		19,000	18,800
New Mexico	205,675	1,675	207,350	205,475
Oklahoma	519,800		519,800	521,200
Texas	2,713,200	53,000	2,766,200	2,665,400
Dist. 1	42,975	575	43,550	40,475
Dist. 2	142,950	7,900	150,850	142,600
Dist. 3	423,175	25,000	448,175	439,000
Dist. 4	251,675	6,200	257,875	245,800
Dist. 5	46,250	450	46,700	38,650
Dist. 6	116,050	5,800	121,850	114,200
East Texas field	239,850		239,850	227,000
Dist. 7-B	133,925	75	134,000	125,075
Dist. 7-C	175,600	4,750	180,350	179,850
Dist. 8	865,300	1,600	866,900	846,700
Dist. 9	191,000	600	191,600	185,500
Dist. 10	84,450	50	84,500	80,550
Utah	4,500		4,500	4,450
Wyoming	234,100		234,100	233,600
North Dakota	14,900		14,900	14,700
Total U. S.	6,330,100	107,775	6,437,875	6,305,875
Change from previous week.			up 132,000	
Canada	286,350		286,350	292,800

Total U. S. production January 1-March 6 410,509,600 bbl.
Same period last year (crude plus cond.) *426,140,410 bbl.

*Includes 5,998,750 bbl. condensate.



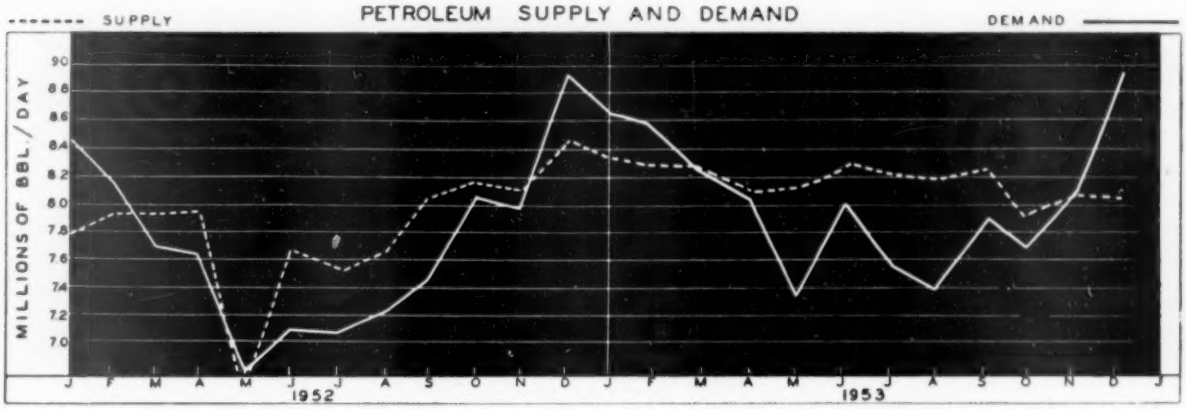


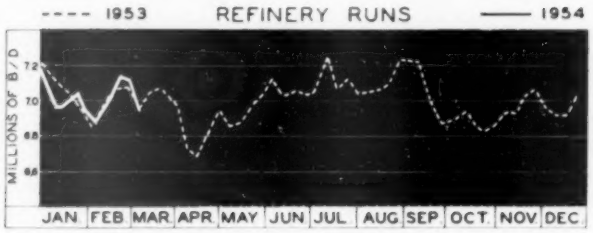
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

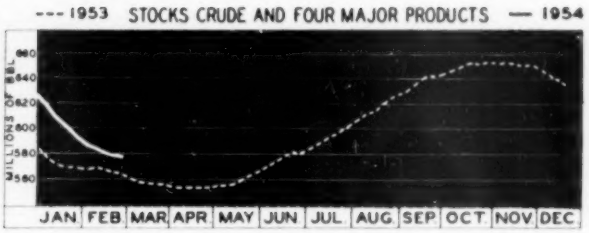
(Thousands of barrels)

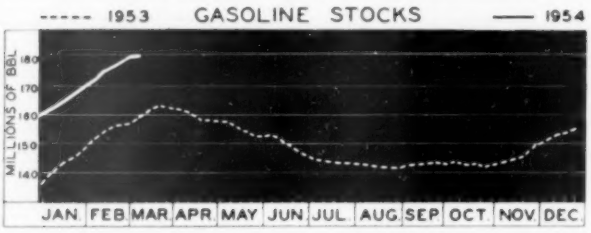
	Feb. 27, '54	Feb. 20, '54	Feb. 28, '53
Pennsylvania Grade	2,704	2,681	2,327
Other Appalachian	1,742	1,914	2,030
Illinois, Indiana, Michigan	12,004	11,864	10,138
Arkansas	2,972	3,012	2,997
Louisiana	14,323	14,552	16,540
North	2,612	2,473	2,986
Gulf	11,711	12,079	13,554
Mississippi	3,307	3,285	3,797
New Mexico	8,013	8,151	7,465
Oklahoma and Kansas	36,408	36,606	36,478
Texas	121,049	122,335	135,569
East Texas	11,015	10,795	11,369
West Texas	51,835	52,769	64,646
Texas Gulf	24,514	25,311	25,828
Other Texas	33,685	33,460	33,726
Rocky Mountain	16,574	16,675	15,802
California	33,871	33,292	32,705
Foreign	†11,294	11,849	8,275
Total	264,261	266,216	274,123

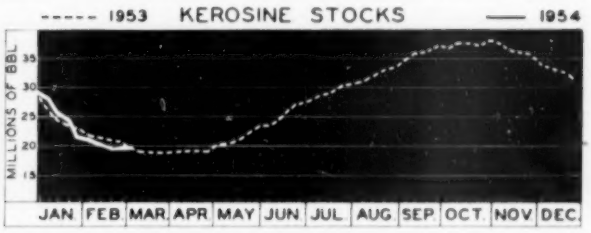
*Bureau of Mines. †Includes 3,061,000 bbl. in California.

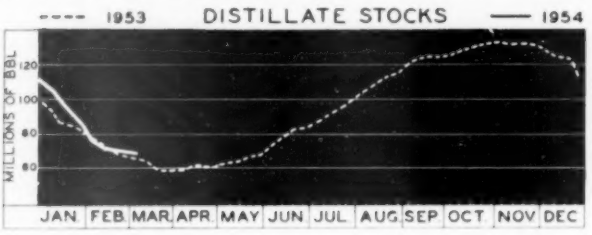


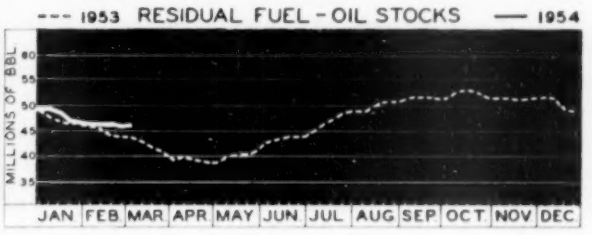










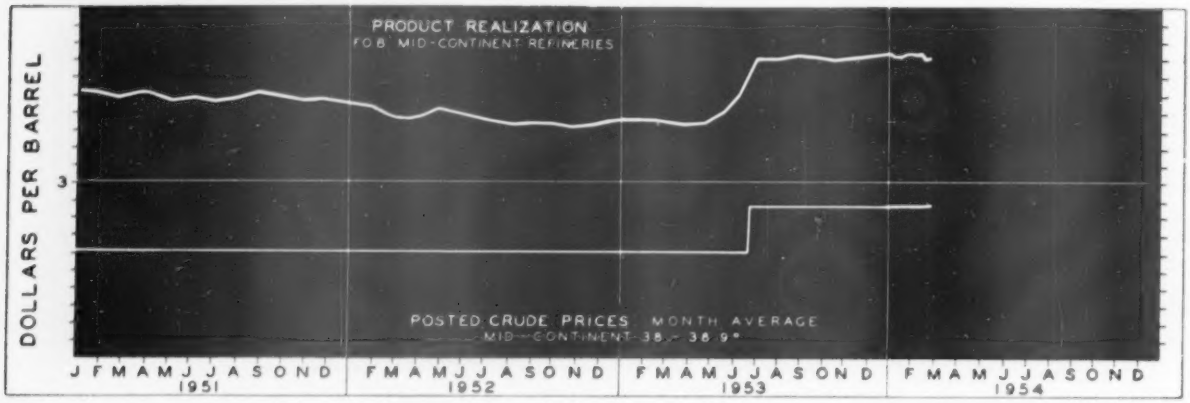


A.P.I. REFINERY REPORT, MARCH 6

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks† Gaso.‡	Kero.	Dist.	Resid.	Bureau of Mines, March 1953 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	989	426.3	47.3	296.6	213.6	35,561	8,547	24,757	9,726	1,044	398.9	36.4	258.5	233.0
Appalachian:														
District 1	116	48.7	8.9	25.3	12.3	4,469	480	1,094	652	108	43.4	6.6	20.1	15.3
District 2	98	50.4	7.0	19.7	15.0	2,135	391	499	234	96	47.2	7.0	15.4	16.0
Ind., Ill., Ky.	1,287	674.2	79.7	269.8	177.7	40,177	4,516	11,028	4,565	1,241	657.0	71.1	218.0	164.3
Okla., Kans., Mo.	565	335.4	12.0	156.0	37.0	19,344	1,088	7,072	1,145	576	334.7	13.0	132.7	58.0
Inland Texas	232	176.1	9.4	44.9	25.6	7,403	293	1,079	1,242	254	164.2	12.3	44.3	33.4
Texas Gulf Coast	1,707	788.3	149.7	396.3	241.8	24,723	2,174	5,893	5,245	1,779	798.2	145.4	428.1	248.1
La. Gulf Coast	579	263.3	93.7	97.4	51.4	10,444	1,539	2,792	903	534	269.4	51.3	141.4	49.4
N. La. and Ark.	92	38.7	9.4	21.7	6.6	4,068	380	956	94	79	31.5	7.5	17.6	6.8
Rocky Mountain:														
New Mexico	18	12.3		2.8	2.7	200		34	31	18	10.7	0.5	2.7	4.2
Other Rocky Mtn.	242	124.7	4.2	51.9	36.7	8,031	172	1,943	758	230	106.3	2.4	50.6	42.3
California	1,026	472.2	4.7	134.3	350.3	22,648	325	11,047	21,470	1,043	457.6	5.7	159.5	385.1
Mar. 6, 1954	6,951	3,410.6	426.0	1,516.7	1,170.7	179,203	19,905	68,194	46,065	7,002	3,319.1	359.2	1,488.9	1,255.9
Feb. 27, 1954	7,123	3,501.6	427.7	1,545.4	1,275.4	179,170	19,506	69,137	45,941					
Mar. 7, 1953	6,963	3,304.4	423.7	1,471.0	1,290.7	159,434	19,843	65,476	43,628					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES, MONTH AVERAGE
MID-CONTINENT 38.- 38.9°
J F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953
F M A M J J A S O N D
1954

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.70 for week ended February 27, $3.69 for previous week, and $3.37 for February 1953. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of March 10, 1954. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.75-11	11.75-12.25	10.25-10.50
Premium gasoline	11.75-12	13.25-14	11.75-12.25
42-44 w.w. kerosine	9.125-9.375	10.4-10.65	9.5-9.75
No. 2 straw fuel oil	8.25-8.375	9.4-9.65	8.5-8.75
No. 6 residual	$1.25-1.40	$2.20-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	15.5
2,000 vis., 5-6 neutral	17

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	14.25

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5
180 vis., 10 p.t. neutral	22.5

WAX
Mid-Continent

132-134 A.M.P.	6.0

ESSO STANDARD OIL CO. announced an additional voluntary allowance of 0.25 cent a gallon off barge prices for kerosine and No. 2 fuel in New York Harbor in order to meet competition. This reduction brings the total allowance to 0.5 cent a gallon off normal postings for these products. The new net price for No. 2 is 9.4 cents with kerosine 1.0 cent higher. Late reports indicate that most other suppliers have met the new prices.

Activity in the Harbor burning-oil market has been generally light since the first of March with secondary suppliers buying only to cover immediate needs in order to have near-empty tanks at the end of the heating season.

Tanker rates have changed very little in the past few weeks. In the first week of March, one clean tanker was reported taken for a single voyage at USMC minus 25 per cent. Since the Gulf Coast market is relatively firm at 8.5 cents a gallon for No. 2 and 9.5 cents for kerosine, the present tanker rate would result in a cargo price for No. 2 in New York Harbor of about 9.3 cents. This price leaves the very small margin of 0.1 cent between cargo and barge prices.

If this small differential between cargo and barge prices continues, it will tend to discourage any spot movement of No. 2 or kerosine from the Gulf Coast.

Any backing up of distillate and kerosine inventories on the Gulf Coast would increase pressure on markets in that area. Most of the addition to Gulf-East Coast gasoline inventories has been on the Gulf Coast, and increases in burning-oil stocks would put a bigger premium on clean storage.

Movement of gasoline into pipe-line storage in February relieved some of the pressure on the Group 3 gasoline market. Inventory increases for the next few weeks in District 2 will add to gasoline stocks at refineries. Pressure on the market will be determined by these increases.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87	....	....	
15-15.9	1.93	....	....	
16-16.9	1.99	....	....	
17-17.9	2.05	....	....	
18-18.9	2.11	....	....	
19-19.9	2.18	....	....	
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9	....	2.76	3.09	2.63
34-34.9	....	2.78	3.11	2.65
35-35.9	....	2.80	3.13	2.67
36-36.9	....	2.82	3.15	2.69
37-37.9	....	2.84	3.17	2.71
38-38.9	....	2.86	3.19	2.73
39-39.9	....	2.88	3.21	2.75
40 and above	....	2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective January 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

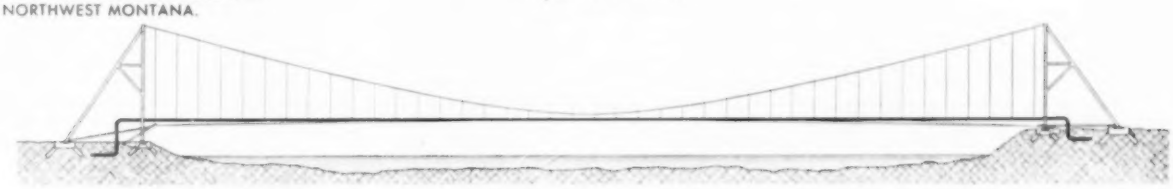
Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.76
Middle District	3.70
Southwest Pennsylvania	3.31
West Virginia	3.25
Ohio	3.24
Illinois Basin	3.02

CLEAR SPAN
BRIDGE & BARGE CO., INC.

11th Floor, Prudential Bldg., Houston, Texas

AFFILIATE: CLEAR SPAN ENGINEERING CO., INC.,
11th Floor, Prudential Bldg., Houston, Texas
Telephone KE-1940

SEVEN BRIDGES OF THIS TYPE FOR YELLOWSTONE PIPE LINE CO. NOW NEARING COMPLETION IN NORTHWEST MONTANA.



ANY LOAD — over — ANY SPAN — ANYWHERE

NOW PLANNED AND BEING BUILT FROM THE ROCKY MTN. CANADIAN BORDER TO THE FLAT SHORES OF THE GULF OF MEXICO. THIS NEW TYPE SUSPENSION BRIDGE IS EFFECTING SAVINGS UP TO 30% OF CONVENTIONAL COSTS FOR SPANS RANGING FROM 400 FT. TO 2000 FT. SIMILAR SAVINGS TO BE EXPECTED ON LONGER SPANS.

MAJOR ROADS AND HIGHWAYS

INTERNATIONAL BRIDGE OVER
RIO GRANDE RIVER—
FULL H20-S16 HIWAY SPEC.
LOADING—BOX GIRDER CONSTR.
APPROX. 25% SAVING OVER CONVENTIONAL TYPE OF HIWAY BRIDGE.

OIL FIELDS & CONSTRUCTION SITES

INSTALLED IN 1½ DAYS
SPAN=120'
LIVE LOAD CAP.=160,000#
RELOCATE ANYWHERE IN TWO DAYS
IT FLOATS—CAN BE DELIVERED
TO SITE BY FLOATING IN.

"CLEAR SPAN" SUSPENSION TYPE BRIDGES ARE AVAILABLE FOR SPECIAL PIPE LINE CROSSINGS ANYWHERE. GIRDER TYPE BRIDGES ARE ESPECIALLY WELL SUITED TO HEAVY LOAD CARRYING REQUIREMENTS FOR OIL FIELD AND PIPE LINE CONSTRUCTION EQUIPMENT

CLEAR SPAN
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WELDON APPELT, PRESIDENT — R. E. TODD, VICE-PRES. — PAUL ROBISHAW ENGINEER

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Telephone KE-1940

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Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

HELP WANTED

OIL INDUSTRY Employment Service, Tom Robinson, owner, 405 Tuloma Bldg., Tulsa, Oklahoma. For technical and trained oil industry personnel. Write for blank.

PHOTOGEOLOGIST—To head photogeolic interpretation section. Must be College graduate—5 years experience—mining experience desirable. Write giving age, education, and full details of experience. All replies confidential. Box G-968, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING REPRESENTATIVE

Major drilling company has opening around April 1 for contact and public relations man in Mid-Continent area, between ages of 30 and 40. Must be well acquainted with oil fraternity and have good personality. Drilling experience desirable. Must be able to furnish excellent references, past employment record, and educational background. Good position for right party. Box G-980, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE MANAGER

Independent production firm in Oklahoma desires experienced manager to act in capacity of president of company. Must be experienced executive in all phases of petroleum industry—others need not apply. Salary commensurate with ability and position. Complete information in application should include age, marital status, detailed experience and education.

Box G-984
The Oil and Gas Journal
Tulsa, Oklahoma

OVERSEAS POSITION GEOLOGIST

Roving overseas assignment with Standard Oil Company (New Jersey) available for qualified geologist. Will consider geologist with B.S. or M.S. degree, inexperienced recent graduate to several years professional experience. Age 21-28, unmarried.

Will be required to assist in reconnaissance geological surveys to evaluate areas of interest. Position available immediately.

Write giving details of personal data, education and experience.

Box 308-P
RADIO CITY STATION
New York 19, N. Y.

HELP WANTED

EXPERIENCED OPERATORS & MAINTENANCE MEN for new small refinery being completed March 1954. Texas MEK deoiling process. Send statement of qualifications to P.O. Box 863, Salt Lake City, Utah.

ENGINEERS, Executives, Technical Men Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates 434 Frick Bldg., Pittsburgh 19, Pa.

PETROLEUM OR RESERVOIR ENGINEER

For New York office of major foreign producer. Proficient in mathematics with 4 or more years' extensive experience in oil and gas reservoir engineering on primary and secondary recovery problems. Duties will include preparations of basic field production and reservoir data for application in analogue and digital computors, performance of analytical analysis of field behavior and interpretation and preparation of resulting data for reservoir engineering reports on specific fields.

Write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-1
Arabian American Oil Company
505 Park Avenue
New York 22, N. Y.

Party Chief and Seismologist

Newly formed geophysical organization of major oil company needs experienced party chief. Also needs record interpreter with minimum of 2½ years experience and 6 months record picking.

Our employees know of this ad.

Box G-987
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

INSTRUMENT ENGINEER

Expanding instrument manufacturer has opening for instrument engineer with at least seven years experience, preferably in manufacturing and assembly of industrial instruments. For the right man this job could lead to managerial position. Must be aggressive, capable supervisor, and willing to assume responsibility. Age 30-40. Salary open. Apply to Industrial Instrument Corporation, P. O. Box 1909, Odessa, Texas.

WANTED: Graduate Petroleum Engineer with varied experience in completion and reservoir work by independent oil company. Give full particulars of experience and salary expected in first reply. Box G-969, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

GEOLOGIST

Independent oil company has opening around April 1 in Tulsa office for geologist with major company training in Mid-Continent Area. Male or Female. Must be good draftsman and have ability to do contour mapping and preliminary lease evaluations. In replying give past employment record, educational background, and age. All replies strictly confidential. Box G-997, The Oil and Gas Journal, Tulsa, Oklahoma.

TOP NOTCH REPRESENTATIVE

Preferably chemical engineer by training for firm of engineers and constructors to the petroleum and chemical industries. East coast location. Only man with record of achievement should apply. Our employes know of this advertisement, and all replies will be held in confidence. Box G-988, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER with structural experience and some knowledge of drilling equipment or methods desired by recognized oil field equipment company for contact work and sale of derricks and all related drilling structures. Box G-990, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

ENGINEER, B.S.E.E., 38. Power, control, telemetering, carrier, radio, instruments, cathodic protection. Box H-100, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT TECHNICIAN: 37, 10 years industrial experience. Desires south-western location. Box G-998, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, fifteen years' experience in the operation and design of Gasoline Plants, Refineries and Petro-Chemical Plants, specialized in the design and operation of high purity ethylene plants. Desires responsible position with a progressive Oil Company. Box G-791, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1928. Ph. No. 3-3141, Hobbs, New Mexico.

GRADUATE GEOLOGIST, 27, five years varied experience in geophysics, reservoir engineering, and well-sitting, desires geological connection with independent, small major, or consulting firm. Box G-978, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: Twelve years experience in oil processing; laboratory, development, pilot plant operations, administration. Record shows progressive advancement. Now holding responsible position. Box G-973, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 24, single, 2 years varied experience. Relocate Mid-Continent. Desire position with major or independent with chance for advancement. Box G-971, The Oil and Gas Journal, Tulsa, Oklahoma.

PILOT-ENGINEER: Graduate Geological Engineer with mapping and photo experience, current Multi-Engine Airline Transport Pilots rating, 4000 hours, desires combination position flying multi-engine airplane and engineering. Box G-999, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 31, married, B.S. Degree Texas A & M College, 5 years' experience in Gulf Coast and Venezuela. Exploration, exploiting, reservoir and regional studies, reserve estimates and administrative background. Foreign or domestic operations. Box G-994, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: B. S., 5 years refinery operating and engineering experience. Desires engineering or supervisory position in refining, Petro-chemical or related fields. Box G-991, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Seven years seismograph experience, age 30, family. Box G-986, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER, 31, married, 4 years supervisory experience with pipe line company; 3 years in field supervising construction. Desires immediate employment. References and complete resume upon request. Box G-985, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

Excellent opportunity for operator or group, seeking geologist to represent them in Central and West Texas. Thoroughly competent and experienced geologist available for headquarters in Abilene, Texas. Investigation and references excellent. Price's Oil Executive Personnel Agency, 239 White Building, Abilene, Texas.

WANTED IN CANADA

EXPERIENCED MAUFACTURER REPRESENTATIVE IN CANADA DESIRES ADDITIONAL ACCOUNTS. MANUFACTURERS NOW REPRESENTED INCLUDE GRAY TOOL CO. AND VENTURA TOOL CO. BEST OF REFERENCES.

LEIDECKER TOOL CO. LTD.
6921 104TH STREET
EDMONTON, ALBERTA CANADA
PHONE 35016

EQUIPMENT FOR SALE

40 ea. Cable Tool Stems—4" to 5½" O.D. 20 ea. 5½" x 36" Fishing Jars W/3¾" Joints 95 ea. Bailers—4¼" to 10" O.D.—25' to 70 Lengths. 84 Sand Pumps—Spang—Larkin—Miller—All Sizes. Well Servicing Units—All Sizes—Truck Mounted or Skid Units. RI. Cardwell Double Drum Spudder—Excellent Condition. General Tool & Supply Co., Box 4387, Oklahoma City, Oklahoma.

SHRIVER 42" x 42" cast iron Filter Presses, Plate & Frame Type; 15—Sperry 18" x 18" cast iron Filter Presses, 11 chambers; #12 Sweetland Filters. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 150 Observer Highway, Hoboken, N. J. N.Y. Tel. BArclay 7-0600.

FOR SALE: Approximately 7900' of 3½" OD Drill Pipe with 5" OD Hughes Flash Weld Tool Joints. Practically new. Lawless Drilling Company, Inc., Odessa, Texas. Phone 6-5982.

FOR SALE: 20,000' 1" seamless pipe. New threads. New couplings. Better than new. While it lasts at 12c. M. J. Regan Pipe Co., Coffeyville, Kans.

FOR SALE: 4600 feet of 2½ EUE used tubing in extra good condition located in Sterling, Colorado. Phone 1348-W. E. W. Olson, 320 Denver Street, Sterling, Colorado.

DEPTH AND TEMPERATURE machine. Built by government. Very good condition. Harry J. Abrams, 331 Emerson N.W., Washington 11, D. C.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

WORTHINGTON ENGINE

415 HP, 360 RPM, Model DD 5, 5 cylinder, 4 cycle, Diesel and Gas. 13¼" bore, 17½" stroke. Completely rebuilt and guaranteed.

MANUFACTURERS EQUIPMENT CO.
1878 E. 18 St., Cleveland, Ohio

Save Threads—Prevent Seizure!
ARMITE DRILL COLLAR & TOOL JOINT COMPOUND
ARMITE LABS., 6609 Broad St., Los Angeles 1, Calif.
Esch-Condit, Inc., Box 2071, Houston 11, Tex.

FOR SALE

9 WORTHINGTON VACUUM PUMPS, Feathervalve, single cylinder, 25" dia. cylinder, 18" stroke.
38 BUFFALO GEAR PUMPS, size 1½" cap. 7½ G.P.M.
27 BUFFALO CO. TURBO FANS, type LL, size 3½" bore, conoidal fans.
37 STORAGE TANKS, 7' x 16', 95 barrel, horizontal, ½" welded tank steel.
9 VACUUM STILLS, 9' x 30' max. press. 60-70 mm., hg. vacuum, max. temp. 660° F., approx. wgt. 36,000 lbs.
12 STEEL BOXES, 8' x 8' x 30', ¼" steel plate
1 SURGE TANK, 10' x 14'.
3 BAROMETRIC CONDENSERS.
1 HORIZONTAL TANK, 4' x 9'
1 STEAM SEPARATOR.
1 VACUUM VAPOR CONDENSER.

Prices less than 25% of cost, condition mostly excellent. Located St. Louis District. Material recently dismantled from oil refinery. Many more items too numerous to classify. Write for complete list.

M. E. FITERMAN CO.
2031 Railway Exchange Bldg.
St. Louis, Missouri
Garfield 2677

THE PURDY COMPANY
8754 Dodson Ave.
Chicago, Illinois
Bayport 1-2100

EQUIPMENT FOR SALE

FOR SALE: Two 18-trace sets of Reflection Seismograph instruments, Rack and Panel mounted. One set mounted in instrument cab, on 1951 GMC Truck, model 301-24. Very reasonably priced. Texas Seismograph Co. Box 2069. Phone 3-1493. Wichita Falls, Texas.

PUMPS FOR SALE at Seminole, Oklahoma; 4 Goulds Figure 1671 Vertical Triplex Pumps, 90, 120 Bbl. per hour, 650# to 800# Pressure, $500 each. Joe A. Huitt, Deep Rock Oil Corporation, Tulsa.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE: Model 300 Brewster Draw Works, powered with 2—GAK 125 Hp. Compounded. This equipment in drilling service in Cowley County, Kansas. Fortier & Wright Drilling Co., 600 Petroleum Bldg., Wichita, Kansas.

SEVERAL FAILING MODEL 1500 rigs, various ages, conditions and inventories. P. O. Box 643, Billings, Montana.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-56 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

SACRIFICE

8 NEW
Westinghouse VHS Motors
100 hp. explosion-proof

Nationally known manufacturer purchased these motors for a project which was cancelled. For attractive price and full data, write

Box G-992
The Oil and Gas Journal
Tulsa, Oklahoma

PACKAGED GAS DESULFURIZATION UNITS

All sizes for pipe line and fuel gas requirements.

WRITE—WIRE—PHONE

GRAFF ENGINEERING CO.
3415 Westminster Ave.
Dallas, Texas
Phone Justin 2153

U. S. ENAMELING CO.

Brackets SIGNS Standards

for the entire industry

Lease-Well, Sales Promotion, Safety

Quality———Economy

Tulsa—Box 4116

Sand Springs—Box 448

EQUIPMENT FOR SALE

FOR SALE: 13 tank car tanks with dome, 6000 to 8000 gals. capacity, 5 upright tanks capacity 6000 gals. All 1/4" plate, all clean and good condition. Your choice $450.00. Take all $425.00. M. J. Regan Pipe Co., Coffeyville, Kansas.

250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lundquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

FOR SALE: Two 24-L drilling machines, A-1 shape. Contact N. Y. K. Oil Company, Nowata, Oklahoma, Phone 437.

TD-24 Tractor w/Superior side boom pipelayer located Houston. Pr. $5900. D-7 tractor with Trackson side boom f.o.b. Houston $4500. A.C.R. Co., 19615 Nottingham Rd., Cleveland 10, Ohio.

FOR SALE: ENGINE—165 Hp. Climax T-61 on Skid. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

FOR SALE: Small rotary rig mounted on tandem truck. 54 ft. mast derrick type, 2200 ft. of 2⅞ inch I.F.E.U. drill pipe, two (2) mud pumps, dog house, tool box, water tank, oil field truck and trailer. Complete rig ready to work. Good for shallow wells up to 2500 ft. For information P. O. Box 643 or phone 2238, Coleman, Texas.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED: Either Walker-Neer, Model 310 or Bucyrus No. 48, with or without tools. Supply complete information first wire or air mail. Sioux Drilling Company, 503 Seventh Street, Rapid City, S. D.

WANTED: Used 5 x 8 horizontal, single action, Triplex power pump. Please state make and condition. Acid Engineers, Inc., Lakin, Kansas.

WANTED: Good Used 1" or 2" to 8", OK or New Deal Pipe Cleaner. Detailed Condition. Onsel Brothers, Risingsun, Ohio.

WANTED: A complete up-to-date Rotary Drilling Rig with portable mast, but less drill pipe, capable of drilling to 5000 ft. with 4½" pipe. Write giving all details, location and price. Box G-995, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

FOR SALE MAPS

RAND-McNALLY U. S. SURVEY MAP. Combined with Pronto Land Measure land description work and charts. 17x22 inches, printed two sides—crammed full of practical land measure information. Compiled and published by repeated requests from our customers all over the United States. Invaluable for a better working understanding of the Rectangular Survey System. No other like it! Mailed first class mail, for only $1.00. Money back if you are not satisfied. PRONTO LAND MEASURE, 510 Sill Building, Flint, Michigan.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

ROYALTIES

OIL ROYALTY FOR SALE: 1/32 undivided interest in 3200 acres. Producing well within one mile of east line Cheyenne County, Nebraska. Price $2500.00. P. O. Box 216, Sidney, Nebraska.

OFFERING CHOICE ROYALTIES on geology in Oklahoma's greatest oil fields. A. S. Berry, 522 Wright Bldg., Phone 5-5402, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

WANTED: Small blocks, oil, gas leases, for secondary recovery. Box G-954, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Attractive surface structures in Overton County, Tenn. Seven sands above 1600 feet. Seven rigs drilling in adjoining county. N. M. Sauls, Geologist, Cookeville, Tenn.

CHEAP LEASES & ROYALTIES AVAILABLE: Due to other interests will sell my unproven acres to highest bidders. Wyoming—18,000 acres—leases. North Dakota—2,000 acres—leases. Colorado—480 acres—leases. North Dakota—800 acres—minerals. Write for list. Box G-887, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. BOWLES, Box 947, Ada, Okla., for attractive drilling deals and producing royalties.

FOR SALE: 640 acre lease, Denver Julesburg Basin, Laramie County, Wyoming, 17-14n-63w, expires 1957. 160 acre lease, Sherman County, Kansas, NW¼, 11-6s-39w, expires 1958. Edward Walz, Gulph Road, Wynnewood, Pa.

LEASES AND DRILLING BLOCKS bought and sold, all areas in Southwestern States. D. W. Burkett, 3455 Johnette, Shreveport, Louisiana.

LOUISIANA: East Baton Rouge Parish, approximately 1000 acres. Located in T8S-R2E, between Atlantic's discovery #1 and #2 L. A. Morgan wells, and Kleinpeter Junction. Acreage surrounded by Major Oil companies. Want this acreage drilled, but will consider other propositions. Box G-989, The Oil and Gas Journal, Tulsa, Oklahoma.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

MAJOR OIL STRUCTURE

SW. Wyoming parallel anticline west of large major wells producing in Frontier & Sundance sands. U. S. Gov't leases on structures offered. Complete data on request to oil men and investors.

W. J. PETERMAN, Geologist
Portales 1910-1954 New Mexico

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

BUSINESS OPPORTUNITIES

MORE VALUABLE THAN GOLD. In the heart of America's Uranium production is sixty Uranium claims that can be had for $250,000. A good bit of drilling has been done and one mine shaft dug ready for inspection. Air Mail your reply to Box 204, Rangely, Colorado.

WANTED

WANTED: STRIPPER PRODUCTION. Bartlesville sand, for water flood. Southeastern Kansas. Please give full information. Box G-996, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE OR LEASE

TWO TRAILER CAMPS: Each camp composed of seven trailers, utility truck, water truck and power plant truck. Each camp accommodates 28 men. United Geophysical Company, 1554 California Street, Denver, Colorado.

ELECTRICAL CONTRACTORS

Office Phone 5-5315 — Res. Phone 7-4950

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
Industrial—Commercial—Distribution

W. L. Ratcliff, P. O. Box 373 — 506 Caddo St., Shreveport, La.

BUSINESS OPPORTUNITIES

CASH AVAILABLE
For Purchase of Producing Oil & Gas Properties

Principals require attractive investment opportunities. Complete information necessary.

Box G-854
The Oil and Gas Journal
Tulsa, Oklahoma

EQUIPMENT MEN
. . . in the News

Quaker Names Lowrey to Western Division Post

Appointment of A. M. Lowrey as assistant general sales manager, western division branches, Quaker Rubber Corp., division of H. K. Porter Co., Inc., Philadelphia, has been announced by G. A. Dauphinais, vice president and general manager.

At the same time, the appointment of W. H. Van Buren as assistant general sales manager, eastern division branches, was announced by Dauphinais.

Lowery has been associated with Quaker Rubber for the past 13 years, rising from assistant manager, mechanical goods division to his present position. In this position, he will coordinate the activities of the eight branches lo-

cated in Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, Minneapolis, Portland, and St. Louis.

Van Buren has been associated with the rubber industry for the past 25 years, joining Quaker in 1945. He will coordinate the sales program of Quaker's eight eastern branches located in Atlanta, Boston, Dallas, Houston, Kearny, N. J., New Orleans, Philadelphia, and Pittsburgh.

Rogers Forms European Exploration Firm

Formation of Societe Exploration Geophysique Rogers, a new geophysical company, has been announced by Sam D. Rogers, president of Rogers Geophysical Co., of Houston. The new company will have headquarters in Paris.

Robert du Pasquier is manager and will be in charge of all European operations for the new company. In addition to Rogers, owners are J. B. Nichols and J. R. Monkhouse, of Houston, and William M. Krum, of Caracas, Venezuela. It is planned to add instrument assembling to the European operations at a later date.

Universal Oil Promotes Three in Research Group

Universal Oil Products Co. has announced three important promotions among personnel at the company's Riverside research and development laboratories.

E. R. Kanhofer was named to the newly created post of general manager of manufacturing activities. H. W. Grote was promoted to assistant manager of the laboratories, the position formerly held by Kanhofer.

Dr. Julian M. Mavity, supervising research chemist, was appointed to another newly created position, that of coordinator of service laboratories.

Jordan Engineering Is Childers Distributor

Childers Manufacturing Co., Houston, has announced the appointment of Jordan Engineering Co., Cincinnati, as sales and engineering representatives for Childers aluminum weatherproof jacketing in southern Ohio.

Jordan Engineering was established in 1921, and also handles hydraulic mechanical equipment, and pipe work.

James W. Deye is president of the company and John Mikesell has recently been added to the sales organization. Mikesell will devote a large share of his time to Childers aluminum weatherproof jacketing.

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NATIONAL RAPID MECHANICAL WATER FILTERS

Four 8′ x 5′ National Rapid Mechanical Water Filters in West Texas.

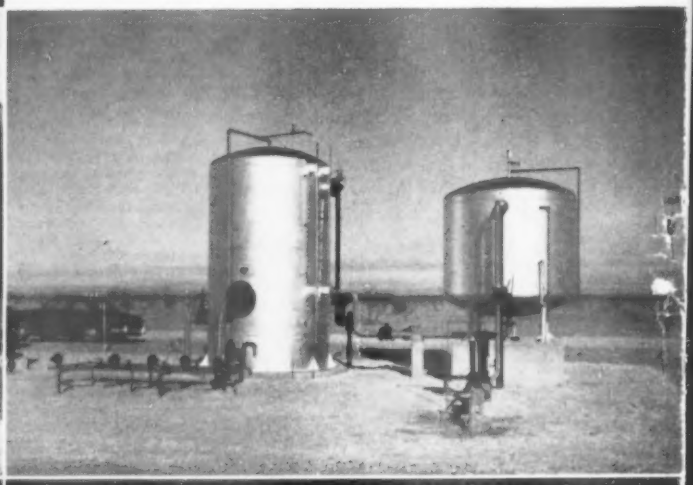
Four 10′ x 5′ National Rapid Mechanical Water Filters on an Oklahoma water flood project.

National Rapid Mechanical Water Filters are used for filtering water in salt water disposal and water flood projects and municipality installations. Filters are rated according to best empirical values. Common backwash rates are 12 to 20 gallons per minute, per sq. ft. of filter area.

Size	Nominal Water Cap. Bbls./Day	Approximate Weight of 40 lb. W.P.
4′ x 5′	1060	1400 lb.
6′ x 5′	2300	2100 lb.
7′ x 5′	3200	2400 lb.
8′ x 5′	4200	3200 lb.
10′ x 5′	6600	5540 lb.

NOTE: Filters are furnished in 40, 75 and 100 PSI W.P.

A National 4′ x 5′ Rapid Mechanical Water Filter in a water disposal plant in Texas.



Injection water passes into National Accumulator from National Rapid Mechanical Water Filter.

It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

3-3-53

FIBERCAST

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Its superior performance proven by many miles in 2 years of service

Above—Salt water disposal line of Fibercast pipe. Note how closely it conforms to irregular contour of ground.

Left—Fibercast pipe offers big savings in handling and transportation, as it weighs one-fifth as much as steel and only half as much as aluminum.

● For gas distribution lines and many oil field uses, Fibercast has important, desirable features.

Fibercast's outstanding ability to resist corrosion gives it long life and excellent reuse value. Its high strength, rigidity and non-shatter quality enable it to withstand rough handling. It is light to handle. It has no elongation and no cold flow, yet follows ground contours. Its values are proven in two years of severe service tests.

Fibercast is centrifugally molded from thermosetting resins reinforced with glass fibers and cured by heat. It is manufactured in 20-foot lengths, of 2⅜", 3½" and 4½" O.D. It is joined with molded threaded couplings of the same material, or "slip" couplings that are permanently joined by chemical bonding. 90° ells, tees and saddles also are available.

For further information, write for our Fibercast Bulletin.

TUBING FIBERCAST LINE PIPE

THE FIBERCAST CORPORATION

P. O. Box 326, Sand Springs, Oklahoma

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